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Frontispiece.

THE AUSTRALIAN AND NEW ZEALAND JOURNAL OF SURGERY

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INTERMEDIATE AND TRANSITIONAL PATHOLOGICAL FORMS BETWEEN HYDATID ECHINOCOCCUS AND ALVEOLAR ECHINOCOCCUS (BAVARO-TYROLIENNE) IN MAN.[1]

By F. DÉVÉ,
Rouen.

With a Foreword by Harold R. Dew, Sydney.

FOREWORD.
(Harold R. Dew.)

IT is hardly necessary to introduce the work of Dr. F. Dévé to Australian surgeons, because wherever hydatid disease is encountered, his name will be quoted as a world authority. In the following article, which is one of the latest from his pen, he re-enters the great controversy as to the unicicity or duality of the hydatid species. This controversy had its origin in the time of Virchow, who in 1856 first recognized the echinococcal nature of a peculiar cystic condition of the liver which had been previously erroneously regarded as a variety of colloid carcinoma. Then followed many contributions from various German, Austrian, Russian and French workers, as this peculiar form of echinococcal disease was found to be relatively common in the central mountainous parts of Europe. As a result, two schools of thought arose —one, supported by Virchow, Leuckart, Jenckel and others, who regarded the two diseases as essentially larval variations of the one parasite: the other, supported by Morin, Posselt, Elevensky and others, who maintained that there were two distinct hydatid parasites. The controversy has been carried on intermittently during the past seventy

[1] Translated by Dr. H. Moran, from *Annales d'Anatomie Pathologique et d'Anatomie Normale Médico-Chirurgicale*, Volume x, Number 9, December, 1933, and reprinted by special permission.

99.

years, its full story being very clearly told in a contribution by Dévé to the First International Congress of Comparative Pathology in 1912. It is of interest to note that the following article was written mainly in reply to Posselt's recent contributions in which, in spite of some important new evidence to the contrary, he has more vehemently than ever contested his belief in the duality of the species. Dévé, who is always accurate and critical, and who is a master of the art of scientific controversy, has realized the importance of this evidence, and in modifying his own point of view attempts to persuade Posselt also. This article, with the original illustrations, has been sent by the writer in response to a special request, and is reprinted in English through the special courtesy of the Editorial Committee of the *Annales d'Anatomie Pathologique*, in which it first appeared. It is hoped that as a result Australian surgeons and others might be restimulated to make accurate observations of all abnormal pathological types of this disease in the hope that further light may be shed on some of the problems which still exercise clinicians and pathologists elsewhere.

Toutes les théories qui servent de point de départ au physicien, au chimiste, et a plus forte raison au physiologiste (et combien plus encore au pathologiste! nous permettrons-nous d'ajouter), ne sont vraies que jusqu'à ce qu'on découvre qu'il y des faits qu'elles ne renferment pas ou qui les contredisent. Lorsque ces faits contradictoires se montreront bien solidement établis, loin de se raidir, comme le scolastique ou le systématique, contre l'expérience, pour sauvegarder son point de départ, l'expérimentateur s'empressera, au contraire, de modifier sa théorie, parce qu'il sait que c'est la seule manière d'avancer et de faire des progrès dans les sciences.—Claude Bernard: *Introduction à l'étude de la médicine expérimentale*, VI. *"Du doute dans le raisonnement expérimental"*, page 80.

The problem of the exact nature of *Echinococcus alveolaris* (Bavaro-Tyrolienne) still remains unsolved and continues to excite warm controversy.[1] While the Australian authority, Harold Dew, basing his opinion on the study of the first authentic case of *Echinococcus alveolaris* observed in Australia, recently (September, 1931) came to the conclusion "that all hydatid lesions which have been described in man and in animals are essentially the same, and that the polymorphism they exhibit is due to the occurrence of parasitic variations",[2] Adolf Posselt, of Innsbruck, the great specialist in this subject, has recently in three successive monographs[3] again defended and affirmed more strongly than ever his opinion as to the undoubted parasitic specificity of the *Echinococcus alveolaris*.

However, in considering the problem impartially, one must recognize that of the various arguments in favour of the parasitic duality of the echinococcus,[4] the geographical argument has lost its force and consequently its value since undoubted cases of *Echinococcus alveolaris* of purely local origin have been observed in the Argentine Republic (case of M. Viñas), in Australia (case of H. Dew), and in France even, where three foci are known: in the Juras (series of cases of G. Risserand and J. F. Martin), in Burgundy (case of P. Wilmoth), and in the Artois (cases of P. Desoil, M. Loeper, and R. Garcin).

The zoological arguments, on the other hand, remain very debatable, but it is far from being proved that the characteristics attributed by Posselt[5] to the *"Tænia echinococcus alveolaris"* of Vogler belong specially to it.[6] It is the same for the biological arguments. In fact, it seems that there is nothing strictly specific in the humoral (complement deviation, intradermal and subcutaneous tests) reactions of the *Echinococcus alveolaris*. These are obtained with common hydatid antigen as well as with the alveolar antigen used by Posselt. This we have been able to verify in a recent personal case.[7]

One should, a priori, base the greatest hope on animal experimentation to elucidate the problem. And, for our part, we still think that such experimentation cannot fail to produce valuable evidence in this respect. But hitherto it has failed in its attempts to reproduce the alveolar process.[1]

Finally, there remain the pathological arguments, which are actually the most striking. At first sight the following special facts appear rather imposing:

1. In man, the lesions "parvi-vesiculaires", which are classically seen in alveolar hydatid disease, reveal the same characters whatever be the organ or tissue primarily affected, whether liver, spleen, lung, brain or bone.

2. If they spread to neighbouring tissues from the primary site—adipose tissue, muscle, suprarenal, kidney or vertebræ—the alveolar lesions retain, whatever may be the structure and consistence of these tissues, their own characteristic and evolutional peculiarities.

3. The distant parasitic metastases, that is, by lymphatic paths (regional glands) or by blood stream (lung, brain *et cetera*), always reproduce the alveolar tendency of the primary lesion.

These are facts that we personally emphasized in 1912 in a report to the First International Congress of Comparative Pathology. Posselt, who had pointed them out previously, has insisted on them anew in his recent publication. But another pathological argument has been invoked by the Tyrolienne professor, which, had it been well established, would be strong evidence in favour of the strict independence of the two hydatid varieties.

"A peculiarity worthy of being specially brought out in relief", Posselt wrote in 1900, "is this, that neither in man nor in animals have there been reported any examples of transition between the two varieties or of any link whatever between—each form strictly preserving its individuality."[8]

Irreconcilable dualist as he is, Posselt repeated in 1906 that when they coexist side by side in the same organ, hydatid cysts and alveolar tumours at all times maintain their independence. "Nowhere does one see transitions between the two." "The same remark", he added, "is true for veterinary pathology, particularly for the symbiosis of the two parasitic varieties in the ox."[9]

We ourselves made use of this argument in our report of 1912. Discussing the unicist opinion of Jenckel, we wrote (page 419):

> If it is a question of the greater or less variance of the same "graine", should not one observe, in man, all the intermediate types between the most spherical hydatid echinococcus and the most infiltrated alveolar echinococcus? Now, in human pathology one does not observe spontaneous intermediate modifications between these two great varieties. In man, hydatid echinococcus remains constantly typical, exception only being made for the purely accidental and artificial modification seen in bone.

However, we added (page 420), and in this dissociated ourselves from the absolute opinion of Posselt:

> It is not the same in this respect in animals. One can say that all intermediate forms between the unilocular form and the multilocular form, passing through the diverticular form, exist in the ox and in the sheep.

Posselt has remained to this day firmly attached to his original conception. He has not ceased to defend it in numerous articles and classical treatises. Thus, in his most recent publication (August, 1932), commenting on a case reported by Orth that we presently propose to discuss in detail, he wrote again:

> It is not a question, certainly not [*sicher nicht*, underlined by the author], of a transitional form, which, moreover, has never yet been seen.

The examination of two special cases which have come to our knowledge since the publication of our old report, has led us to ask ourselves if the fixed and imperative opinion of Posselt's is really correct and if hydatid echinococcus does remain as "constantly typical" in man, as we ourselves had formerly maintained.

The two cases in question do not belong to us. Both have already been described and published abroad. But we have recently been permitted to make a personal study of them, and the interpretation we propose to put on them will differ essentially from those which have been put forward.[1]

Brought into relation with the recent case of Dew, which we have also been able to study for ourselves, these two older cases, that of Orth and of Weichselbaum, would seem, if our interpretation is correct, to modify greatly, if not definitely to destroy, the doctrine of the "parasitic duality of the echinococcus" which the articles of Posselt have made classical in German speaking countries.

DISCUSSION OF THE CASE OF ORTH-SCHMIETA.

This specimen had been obtained some time back in 1887 for the Pathological Institute of Göttingen by Johannes Orth, who, in his treatise on pathological diagnosis, referred to it in the following terms:

[1] Thanks to the courtesy of the Professors Georg B. Gruber, of Göttingen, and R. Maresch, of Vienna, we have been able to carry out this study. These colleagues sent us large pieces of the lesions which enabled us to obtain large microscopical sections. We wish to acknowledge publicly our gratitude to our foreign colleagues. We also address our thanks to Dr. Gricouroff, head of the Pathological Laboratory of the Curie Foundation (Professor Regaud), also to our colleague, Professor Caillíau, head of the Pathological Laboratory of l'Hôtel-Dieu of Rouen, who have been in charge of the making of the delicate microscopical preparations.

I have found once beside a hydatid cyst of the spleen as big as one's head, a multitude of smaller cysts as in multilocular echinococcus.[10]

The specimen in question remained unnoticed for more than forty years in the Göttingen Museum.[1] It is only quite recently that it has been brought to light and made the subject of profound study by Hans Schmieta,[11] a student of Professor Gruber. If the description that this author has given of Orth's specimen is entirely correct, the interpretation which he proposes appears to us to be quite unfounded. He describes a voluminous hydatid cyst of the spleen—"it was of the size of a head"—as Orth has told us, which included "numerous daughter cysts with brood capsules and scolices".

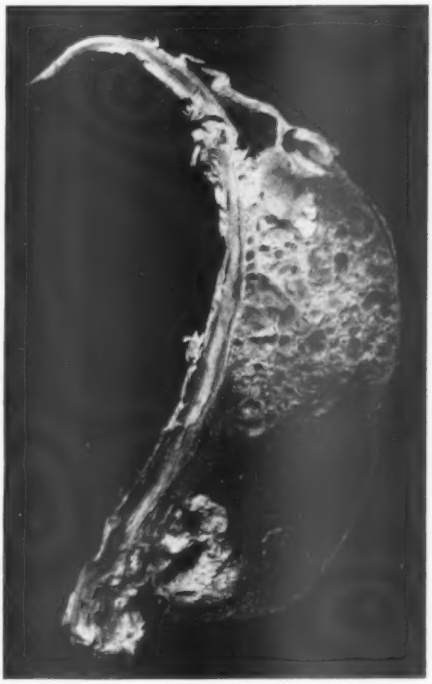

FIGURE I. Orth's case. Micropolycystic echinococcus of the spleen alongside a multivesicular hydatid cyst of that organ. Original photograph, natural size.[2] Note the thick adventitia of the large cyst and the peculiar alveolar appearance of the paracystic lesion.

If this were a full and accurate description, there could be no doubt that this specimen is an example of typical hydatid echinococcus. But Schmieta also writes:

> The adventitia which surrounded the echinococcus was in one place thinned out and perforated. The orifice of the perforation led into a little "tumour" of the size of a nut which was surrounded everywhere by splenic tissue. On section, this tumour was found to be formed of numerous small vesicles.

Schmieta continues:

> Outside the capsule of the large cyst there can be recognized in the splenic tissue a mass of small vesicles joined together, the size of which varies from the head of a pin to a mustard seed. These all contain gelatinous material and present a strongly alveolar appearance. But for the presence of two larger vesicles in the neighbourhood, one might quite easily have mistaken this appearance for an alveolar echinococcus. (Figure I.)

[1] During this time the specimen remained in alcohol. Because of this the nuclear colorations have been found somewhat pale, but the sections remain perfectly easy to read and to demonstrate, as one can judge.

[2] We owe the macroscopical photographs which illustrate this article to M. R. Dasche, of Rouen, and the microphotographs to our friend, M. F. Daligault, of Havre.

Such are the bare facts. Let us now consider the various interpretations that have been put forward. Comparing this appearance with that which we had personally described in our thesis,[12] apropos of experimental echinococcal sowing in the peritoneum of a rabbit, Schmieta considers that in this case we are dealing with a secondary cystic echinococcus (*secundaire cystische Echinokokkose*), with a "secondary dissemination following the rupture of a mother cyst". He disregards the possibility of an exogenous vesicular proliferation—"theory more and more abandoned", he says. In addition, he adds:

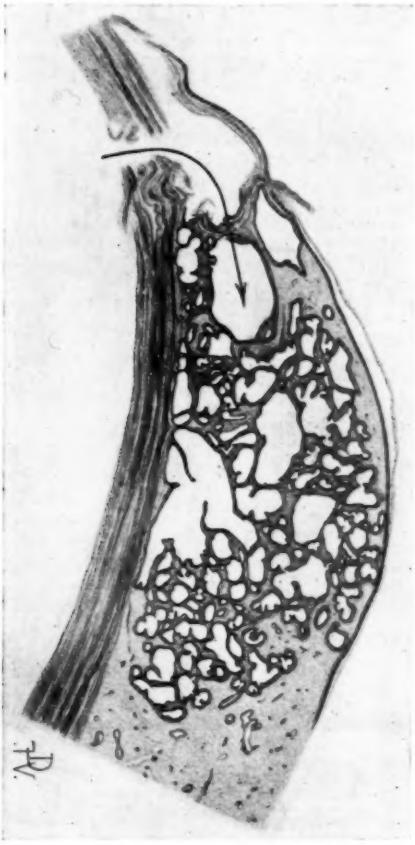

FIGURE II. Orth's case. Personal drawing of a microscopical section of the specimen, natural size. Note, for clarity of demonstration the locules have been drawn as if deprived of their parasitic contents. To the left is the cavity of the primary hydatid, limited by its thick sclerotic adventitia. The arrow indicates the breach through which the exogenous growth took place and the direction of parasitic progression into the spleen. One will note that the capsule of the spleen (to the right) is very little thickened, and that beyond the periphery of the parasitic invasion the splenic tissue is normal, not sclerotic, but perfectly pliable.

> According to Hosemann, when daughter cysts develop in an exogenous fashion they are always only produced in small numbers.

In conclusion, Schmieta made the following doctrinal affirmation which reflects the categorical opinions so often put forward by Posselt:

> We hold firmly that there can be no transition from the cystic hydatid variety to the alveolar, although in our case there are certain areas which resemble, even to the point of deception (*zum Verwechseln*), alveolar echinococcus.

Professor Gruber, having studied the case in his turn, wrote to Posselt and stated that he did not believe that an alveolar echinococcus had developed beside a cystic echinococcus, but that:

> The zone of micro-cystic expansion in the spleen belongs to the hydatid echinococcus. The later shows here a configuration to which, in the liver and the lung of the ox, the veterinary people quite falsely give the name of "multilocular echinococcus".

As for Professor Posselt (who received from Gruber

some sections of this curious lesion), he has expressed his opinion in the following terms:

It shows, as the instructive photographs reveal clearly, a slight external formation which Dévé has designated as multivesicular or as a multisacculation (*wie sie Dévé multivesicular bzw. als Multisacculation bezeichnet*). The case is quite comparable with an experimental echinococcus; the enclosure between two exceptionally thick and resistant layers (perisplenitis and the thick wall of the hydatid cyst) forcing closer and closer together and greatly limiting the extent of the invasion.

And Posselt adds:

It is necessary to emphasize that there is no question here at all of a transition form, which, moreover, has never yet been seen.

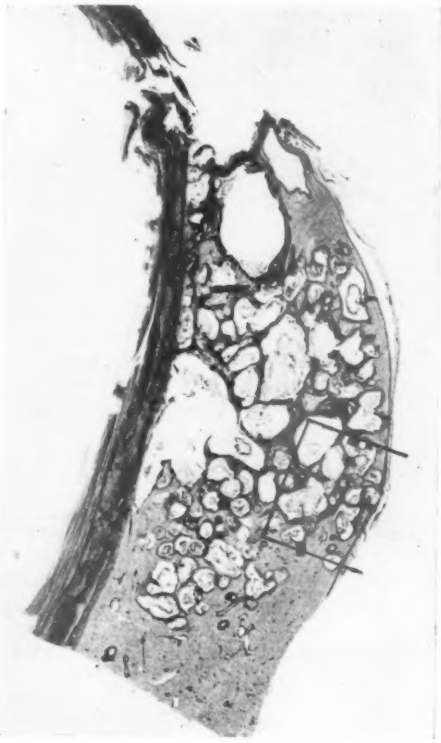

FIGURE III. Photograph of a microscopical section, near the preceding. Twice natural size.

Coming from such authoritative writers these different interpretations demand the most careful attention. They merit all the closer discussion, since the case here envisaged raises a very important question of doctrine.

1. May we say at once that the phenomenon of secondary echinococcosis that we discussed in our inaugural thesis (Paris, 1901) does not come into the question. Schmieta committed an error when he believed that he could rightly invoke our experiments to explain his case. Posselt also was in error when he maintained that this case "is entirely comparable with experimental echinococcus". The comparison is not valid. Undoubtedly we had described in our thesis a polycystic pseudo-alveolar form of secondary echinococcus, both experimental and spontaneous. But the lesions thus considered have quite a specific origin and pathogeny, and they present features, structure and an evolutional character totally different from those seen in the case under consideration. In Orth's case there can be no question of a "dissemination of parasitic seed" or of "sowing of daughter cysts or of scolices" in the depth of the splenic tissue. Moreover, microscopical

examination showed that the lesions assumed an evolutional character of quite another order.

2. In effect, we are dealing here not with a parallel development of different contemporary parasitic elements sown at the same time, but with a progressive hydatid infiltration gradually progressing from place to place. The lesion, which is in no way encysted in a common peripheral adventitia, extends into the depth of the splenic tissue. For, contrary to what Posselt has maintained, there is no evidence of an

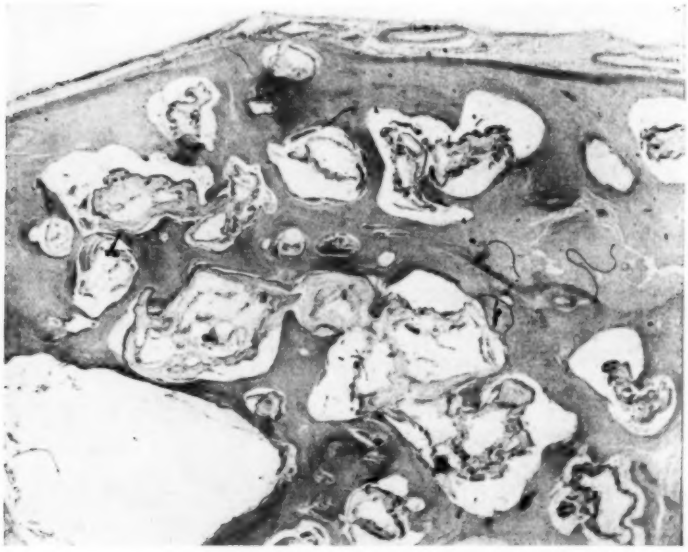

FIGURE IV. Portion of preceding section, showing the zone of parasitic infiltration. Note the quasi-alveolar appearance. × 10.

"imprisoning of the vesicles between two fibrous walls" which has imposed upon the hydatid parasite "this atypical and pathological growth". Quite otherwise, for everywhere at the periphery of the parasitic region the vesicles bud freely into the splenic parenchyma, which has remained supple. It is easy to verify this in our drawing (Figure II) and in our microphotographs (Figures III and IV).

3. Posselt commits a double error when he compares the appearance of this lesion either with what we have personally called "the multivesicular form of hydatid cyst"[13] or with what we have described under the name of "exogenous cortical multisacculation".[14] Neither of these developments really comes into the picture when discussing this case, for even if the second of these processes can be regarded as having

taken place during the early stages of the lesion, it has eventually singularly changed in character.

4. We agree with Gruber, Schmieta and Posselt that in the present case the micro-polycystic splenic lesion does not completely reproduce the microscopical appearance, the histological structure, nor the tortuous nature of a typical alveolar echinococcus. We have here a deformation of the original hydatid echinococcus, certain characteristics of which, especially the presence of a thick laminated membrane, persist in places. But all must agree that, unlike the spherical unisacular and rigidly encysted appearance that it probably primarily showed, this lesion has become curiously "parvivesicular", invasive and extensive, and that it strongly resembles true alveolar echinococcus, so closely, indeed, that Schmieta admits that it could easily be mistaken for this lesion.

Indeed, one is struck by the multilocular appearance, due to the close proximity of very numerous little irregular cavities, forming more or less twisted diverticula. These cavities contain sterile vesicular formations; often two or three or more of them join together in a locule in which the thinned out laminated membrane, folded back in a capricious manner, forms irregular chitinous clusters. These vesicles push their way into the surrounding compressed parenchyma, which at the point of contact has become superficially sclerosed, and form variable prolongations which in their turn have a tendency to be themselves secondarily excluded. Briefly, we have here to deal with a proliferation of exogenous diverticula which recalls very closely that observed in osseous echinococcus and alveolar echinococcus.

Now to explain this obvious morphological deviation from what was originally a typical hydatid cyst, for obviously there can be no question of admitting here the coincidence of two distinct parasitic formations side by side in the spleen. It is impossible here, as in the case of hydatid of bone, to fall back on the explanation of antecedent mechanical conditions. This hydatid cyst has not affected a rigid cancellous tissue which has obliged it to shrink and become stunted by forcibly moulding itself into the pre-existing microscopic "alveolar" calcareous matrix. In the case of Orth-Schmieta, without apparent provocation and in the middle of a soft and homogeneous tissue, the hydatid lesion has lost its natural monocystic character and its regular mode of spheroidal expansion. Without any apparent need the hydatid parasite has taken on a "parvivesicular" form of an infiltrating character, resembling singularly in this characteristic true alveolar echinococcus.

Finally, is it to be said that in this case one encounters a perfect and definite metamorphosis from the hydatid echinococcus into the alveolar form, that is, that we are in the presence of a transition from one variety to another? We should not like to affirm this categorically, but it seems to us that if one is willing to free one's self from doctrinal prejudice, one cannot refuse to see that such a lesion might quite easily represent an intermediate form between the two main pathological types of echinococcus.

In any case, as far as we are concerned, we feel bound to declare today, contrary to the opinion that we formerly expressed, that in man, even apart from hydatid disease of bone, the most typical echinococcus is capable of transformation into an atypical "parvivesicular" form in the same way as echinococcal disease in the herbivora. This first case is sufficiently disturbing to any who observe with true scientific doubt. More disturbing, more suggestive, more positive still will be the following case.

CASE OF WEICHSELBAUM-KOLISKO-POSSELT.

Posselt referred to this case in 1906,[9] and described it as a case hitherto unique, in which a primary coincident development of alveolar and of cystic hydatid echinococcus occurred in the heart.

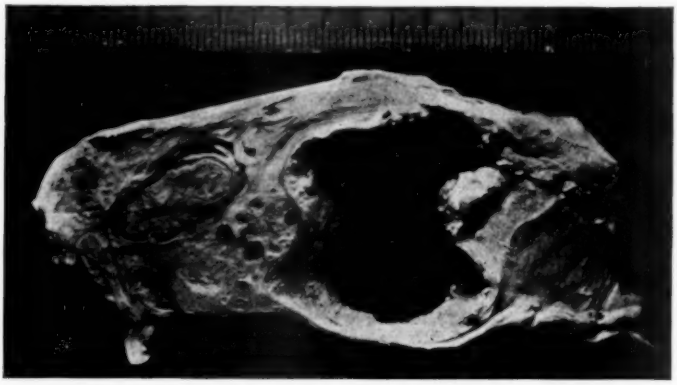

FIGURE V. Weichselbaum's case. Polycystic hydatid of the heart. Section of the cardiac wall, original photograph, natural size. In the centre, hydatid cavity (? primary); to the right, the healthy wall of the left ventricle; to the left, the wall of the left auricle—the seat of infiltration with small hydatid vesicles. In the midst of this a hydatid cyst in involution, measuring two centimetres in diameter, and easily recognizable by the thickness of the folded cuticle. All around this a zone of infiltration with *Echinococcus alveolaris*.

In his quite recent and remarkable publication devoted to the "extra-hepatic localizations of alveolar echinococcus", the Tyrolienne author has quoted the autopsy record written in April, 1898, by Professor Kolisko.

Kolisko had labelled this specimen with the anatomical diagnosis of "multilocular echinococcus of the myocardium and pericardium". Posselt declares that this diagnosis should (*soll*) be corrected as follows: "*Echinococcus cysticus multiplex myocardii et pericardii.*" He adds:

> This case, hitherto unique, is distinguished by the fact that a primary multiple colonization (*primäre vielfache Ansiedelung*) of echinococcus, both cystic and alveolar, occurred in the heart and in the pericardium without involvement of other organs and with complete independence of the mode of growth of the two varieties, without any connections whatever, or modification of the manner of growth which could be described as a transition.

It happens that formerly—to be precise, on September 18, 1912—we ourselves were able to examine this specimen macroscopically at the Pathological Museum in Vienna. We considered it to be a case of secondary hydatid echinococcus of the pericardium, in places curiously parvivesicular, "pseudo-alveolar", following on the intraserous rupture of a primary cyst of the heart.[1]

When one considers the problem, the above interpretation of Posselt appears quite improbable. The simultaneous presence, the parallel development of a primary alveolar echinococcus of the heart, an occurrence of which we know no example in the literature, with a primary

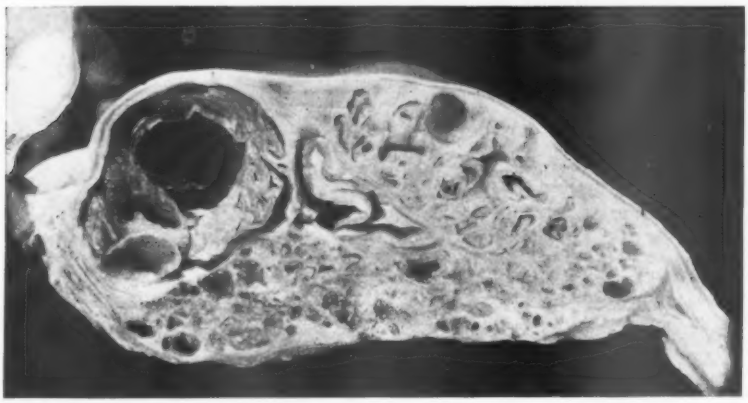

FIGURE VI. Weichselbaum's case. Another section of the wall of the left auricle. Twice natural size. To the right, near the centre of the figure, another hydatid vesicle with collapsed membrane. All around alveolar formation. The intricate mingling of the two parasitic types is obvious.

hydatid echinococcus of the heart, an affection already sufficiently rare, and both occurring in the form of multiple primary colonies—such a coincidence surely appears almost impossible.

We recently submitted an objection on the grounds of common sense to Posselt. But the latter contented himself by replying:

I maintain entirely (*voll und ganz*) my interpretation in respect to the Viennese preparation of echinococcus of the heart.

Good!

What does this specimen show? The autopsy record describes:

1. Towards the apex of the heart a solitary fertile hydatid cyst (with numerous brood capsules) of the size of a nut.

2. In the wall of the left auricle a large hydatid cyst full of daughter cysts (of the size of a pea).

[1] We expressed this opinion to Professor Stoerck, who at that period replaced Professor Weichselbaum (on vacation), and we recommended him to carry out a microscopical examination of the specimen, as that had not been done.

3. As well, disseminated here and there, some more solitary vesicles making spherical prominences on the surface of the heart.

From this description (which corresponds entirely with what we had noted twenty years ago), the first important point which, moreover, is accepted by Posselt, is that we are in part at least dealing with undeniable hydatid echinococcus. On the other hand, there existed at the apex of the heart and under both the visceral and parietal peri-

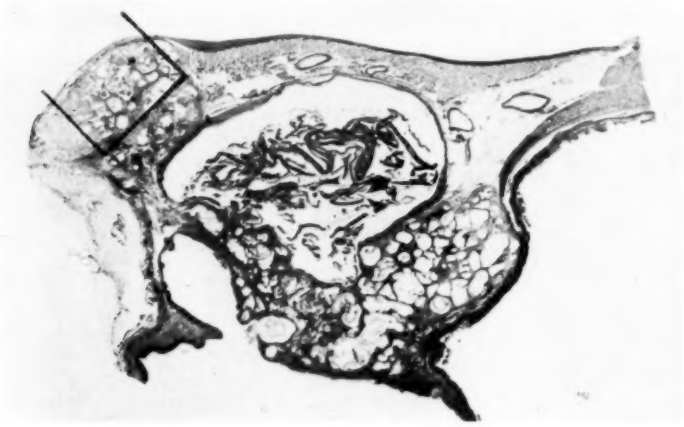

FIGURE VII. Microscopical section of the auricular wall, corresponding to the left half of Figure V. Twice natural size. To the right, the primary hydatid cavity with its regular fibrous adventitia. In the centre, another hydatid cavity filled with folded chitinous *débris*, artificially serrated by the microtome knife. Around this the alveolar infiltration.

cardium, various conglomerations of quite small vesicles "giving an appearance similar to colloid cancer" (*ein dem Gallertkrebs ähnliches Aussehen*).

It is this second pathological appearance—we shall call it provisionally "quasi-alveolar"—which evokes discussion. The autopsy record of Kolisko supplies further information of which we were ignorant on the occasion of our visit to the Vienna Museum. The distended pericardium contained 0·75 litre of purulent liquid, the deposit from which formed a pulp made up of numerous little free cysts, some whitish and murky, the others transparent, somewhat like sago grains. This is a finding which fits in with our original hypothesis of a secondary hydatid echinococcosis of the serous pericardium, a lesion which is not very exceptional, since at the present time we know of 36 authentic cases.[15] Let us come now to our personal study of the lesion.[1]

[1] We have communicated the results of this to the Société de Biologie.[16]

In contradiction to the reiterated affirmation of Posselt, examination of the sections which have been kindly sent by Professor Maresch, both by the naked eye and by a lens, has shown us the striking fact that there is an intimate mingling of the hydatid and the quasi-alveolar lesions (compare Figures V and VI). To begin with, such a feature makes the hypothesis of a simple juxtaposition of two independent parasitic lesions highly suspicious. Microscopical studies have served only to confirm this opinion by rendering it more exact. It has verified the presence of true hydatid formations which can be recognized by their size and by their thick laminated membrane in the midst of microcystic lesions and often in continuity with them. As for the parvivesicular echinococcal formations, they recall in certain places, above all in the

FIGURE VIII. Microscopical section of the auricular wall, corresponding to Figure VI, one and one-half times natural size. Transitional forms, bordering on typical alveolar echinococcus.

zone of the parietal pericardium, the appearance of secondary echinococcosis of serous membranes. However, even at these places they show here and there an external parvivesicular budding analogous in all respects with that so characteristic of alveolar echinococcus.

But in the heart muscle itself, particularly in the auricular wall (Figures VII and VIII), the great number of little vesicles lodged in a fibroid and necrotic stroma, their universally microscopical size, their variable form, the thinness of their laminated membrane (internally covered with germinal membrane) and, above all, their manner of diverticulative proliferation and their mode of growth, all these features were seen to be so identical with those which characterize true alveolar echinococcus that doubt is not permissible. We had here an example of a true alveolar echinococcus (Figure IX). Also, one must remember that Posselt himself had come to the conclusion that this part of the lesion was genuine alveolar echinococcus.

To repeat, these alveolar lesions were in close proximity to a true hydatid lesion. More than that, they were continuous with them by a series of transition forms (compare Figures VII and VIII).

It was not only a question, as in the case of Orth, of an intermediate variation between the two types of echinococcus, which was in its structure almost equally unlike both forms, but one encountered here for the first time in man, the transition so formally and so obstinately denied by Posselt.

With this sort of positive evidence, our demonstration would seem to be complete. However, we think it would be useful to add a kind of counter proof which will, in our opinion, finalize the matter. This inverse proof will be furnished to us by a study of Dew's specimen.

THE CASE OF HAROLD DEW.

As we noted at the beginning, this case, henceforth a classical one, is the first example of alveolar echinococcus observed in Australia, and observed, not in an immigrant coming from Central Europe, but in a native born who had never left his country, "having passed all his life in Victoria and Tasmania".

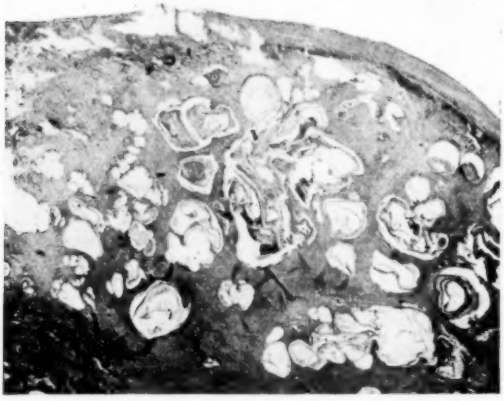

FIGURE IX. Microscopical section corresponding to the left upper angle (enclosed in square) of Figure VII. Nine times natural size. Characteristic alveolar structure.

Now Dew's specimen had the remarkable peculiarity of presenting amongst the fundamental alveolar lesions, cystic cavities of a very unusual size filled with hydatid liquid.

As a preliminary it is necessary for us to show that this is a legitimate case. Indeed, its authenticity has recently been contested by the observer at present rightly considered to be the most authoritative on this subject, namely, Posselt. Let us neglect the clinical history, however much in keeping with the classical description (large liver, neoplastic appearance, chronic jaundice *et cetera*) it may be, and consider the lesions found at autopsy.

In regard to macroscopical appearance, the liver enclosed a large polycystic echinococcal mass, the central portion of which was occupied by an irregular cavity containing two pints (one litre) of bile stained *débris*; a cavity extending up to the diaphragm which adhered to its sclerotic and partially calcified adventitia (compare Dew's Figure I).

The main cavity had a ragged trabeculated, semi-necrotic and bile stained lining, in the interstices of which were found irregular folded pieces of laminated membrane.

Is not this a characteristic description of the *Zentralzerfall* of German authors?

As for the main parasitic mass, it consisted of an infiltration and invasion of the hepatic tissue by a great number of small cysts. Some attained a diameter of 1·5 centimetres, but the majority of them were very small, measuring one millimetre and less in diameter (Dew). All this, supported by convincing illustrations, does it not correspond with the classical description?

It is true that the general multilocular appearance revealed itself in this case in the form of large vesicles; in the main the cysts were

FIGURE X. Dew's case. First Australian case of alveolar hydatid disease of the liver. Photograph of a personal microscopical section. Three times natural size.

not so microscopical as is the case in the usual alveolar echinococcus. We must recognize, however, that this appearance is not unknown in the most authentic alveolar lesions. We have examined and noted personally more than one example of this in the course of our travels, especially in the pathological institutes of Fribourg-en-Brisgau, d'Erlangen, Munich, and even of Innsbruck.

Where the case ceases to be quite typical is that it shows on the under surface of the liver in the periportal hilar region a series of relatively large spheroidal cysts, measuring up to two centimetres in diameter, and filled with clear fluid and, to quote Dew, "resembling ordinary small hydatid cysts, except that they were not fertile". It is precisely the presence of these quasi-hydatid cystic formations which has led Posselt to contest a priori the alveolar nature of this case.

In regard to microscopic structure, thanks to the receipt of two large sections of this lesion from H. Dew in February, 1929, more than two years before the publication of his article, we ourselves have been able to make a histological study of his specimen.[1]

We are able to confirm the true alveolar nature of the lesion. Further, it will be sufficient for the unprejudiced reader to refer to the microphotographs we show here (Figures X, XI and XII), especially to the last, in which a creeping parasitic infiltration in the extrahepatic

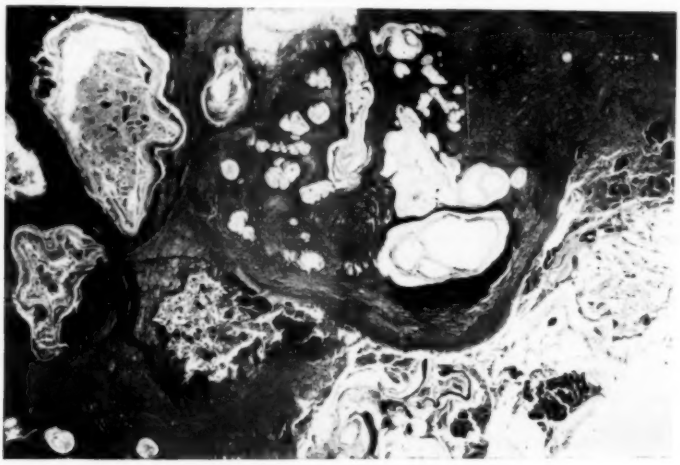

FIGURE XI. Dew's case. Portion (enclosed in square) of the preceding section, eight times natural size. Typical alveolar structure.

fatty cellular tissue can be seen, in order to become convinced of its true nature.

This assurance we had given to Posselt himself, when refuting the objections he expressed in his letters. We were also a little surprised—we say "a little"—to see that, without taking the least notice of our microscopical studies and of our histo-pathological diagnosis, our Tyrolienne colleague recently decided that Dew's case exhibited "the multivesicular form and above all multisacculation"; in other words, that it was (*loco citato*, 1932, page 509) "a hepatic case completely similar to the case of Orth" (*einen vollstandig ähnlichen Leberfall*); that is to say, according to him, a simple case of conglomerate echinococcus.

Certainly in Dew's case some vesicles presented an unusual size. But we cannot understand why Posselt, who apparently accepts without

[1] Dew did us the honour of asking our opinion on the nature of his case, and has acknowledged this in his recent article.(2)

difficulty the alveolar nature of von Hibler's case, for example, refuses to admit this for Dew's case. In von Hibler's case, which was an example of multiple cerebral alveolar echinococcus—as Posselt himself admits, very probably metastatic and not primary—there were fertile cysts of the size of a cherry or a prune in the centre of the typical micro-alveolar lesions. Why should we be prepared to find and admit in

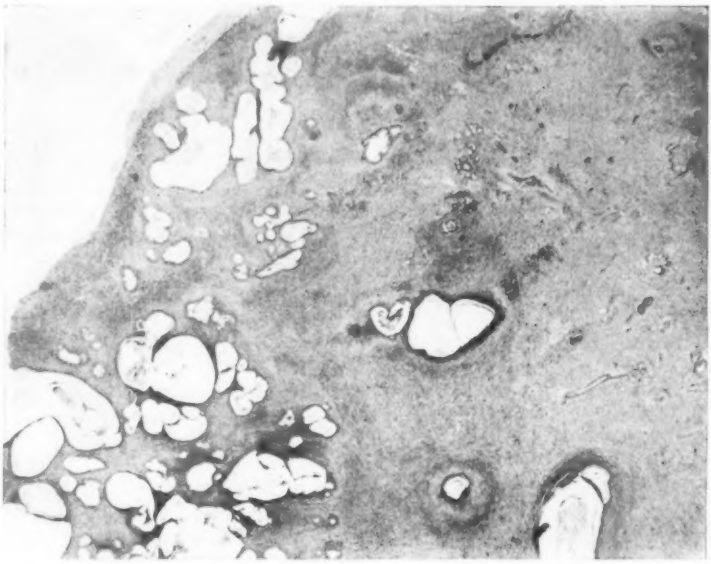

FIGURE XII. Dew's case. Personal microscopical section of another area where the parasitic infiltration is invading the retrohepatic fatty tissue. Eight times natural size. Typical alveolar appearance. The authenticity of Dew's case cannot be disputed.

the brain—there are also other examples besides that of von Hibler—what we do not in the liver?

These three cases speak sufficiently well to render any long commentary superfluous. Orth's case showed us a large ordinary hydatid cyst of the spleen undergoing transformation into a multilocular quasi-alveolar form in the neighbouring splenic tissue. Weichselbaum's case revealed a hydatid echinococcus of the heart with a secondary echinococcus of the serous pericardium with associated areas in which the process was not quasi-alveolar only, but actually alveolar. Dew's case presents the reverse example of an authentic alveolar echinococcus giving rise to quasi-hydatid vesicular formation.

That transitional cases of this kind have been hitherto extremely rare—apart from the special example of bone echinococcus—one must

recognize. Certainly, we must express surprise that such transitions between the two forms of echinococcus, since they can occur in man, do not show themselves more frequently, or at least that they have not been more frequently described. Is it not likely that other examples, insufficiently studied or misinterpreted, have failed to be recognized? This is not impossible. It remains, moreover, for us to explain why the alveolar variety of echinococcus, so rare in other countries, is curiously frequent in the Tyrol, Bavaria and northern Switzerland.

However, once the attention has been called or recalled to these intermediate cases, it will be interesting to see if the number does not increase.

In conclusion, we wish to state that, in order not to complicate our demonstration, we have not brought to the support of our thesis a consideration of hydatid disease of bone. Let us, however, reproduce here the concluding lines of the critical chapter that we devoted to this hydatid lesion twenty years ago, in our report to the First Congress of Comparative Pathology (page 400). They will show that, from the points of view we have just considered, the importance of the lesion in question did not escape us:

> Hydatid echinococcus of bone presents a great doctrinal interest in that it shows that the common hydatid parasite is capable of modifying its manner of budding to the very point of simulating alveolar echinococcus. It can readily be understood how this polymorphism of the hydatid echinococcus has been invoked by the partisans of the unicity of the echinococcus parasite. We must agree that this argument merits much consideration.

CONCLUSION.

In spite of somewhat systematic denials opposed to such a declaration, we believe that the three cases above studied have very solidly established the existence of transition forms between hydatid echinococcus and alveolar echinococcus in man. It is, in the face of a certain theory, a contradictory fact of great value against which it would be vain to stiffen ourselves any longer. This fact admits of a deduction, the doctrinal importance of which there is no need to emphasize. While awaiting the result of further animal experimentation, it would appear to confirm the conception, so long debated, of the parasitic unicity of echinococcus.

REFERENCES.

(1) F. Dévé: *La Prensa Médica Argentina*, September 30 and November 10, 1932.

(2) Harold Dew: "Echinococcus Alveolaris, with Report of an Australian Case", THE AUSTRALIAN AND NEW ZEALAND JOURNAL OF SURGERY, 1931.

(3) A. Posselt: "*Die pathologische Anatomie der veilkammerigen Blasenwurmgeschwulst (Echinococcus alveolaris) der Leber*", *Frankfurter Zeitschrift für Pathologie*, Volume xli, 1931; "*Allgemeine Pathologie der Alveolarechinokokkengeschwulst der Leber des Menschen*", *Ergebnisse der allgemeinen Pathologie und pathologischen Anatomie des Menschen und der Tierre*, Volume xxiv, 1931; "*Die vielkammerige Blasenwurmgeschwulst ausserhalb der Leber (Extrahepataler Alveolarechinococcus*"), *Ergebnisse der allgemeinen Pathologie*, Volume xxvi, 1932.

(4) F. Dévé: "*Échinococcose alvéolaire et échinococcose hydatique*", *Rapport au premier Congrès international de Pathologie comparée*, Paris, October, 1912.

[5] A. Posselt: *Münchener medizinische Wochenschrift*, Number 12, 1906; *Neue Deutsche Chirurgie*, Volume xl, 1928, pages 327 to 337.

[6] F. Dévé: "*Quelle est la valeur du T. échinococcus alvéolaris de Vogler-Posselt?*", *La Normandie médicale*, Number 5, May, 1931.

[7] F. Dévé: "*Présentation d'un malade atteint d'échinococcose alvéolaire (bavarotyrolienne) du foie*", *La Normandie médicale*, Number 5, May, 1931.

[8] A. Posselt: "*Zur pathologischen Anatomie des Alveolarechinococcus*", *Zeitschrift für Heilkunde*, Volume xxi, Number 5, 1900, page 76.

[9] A. Posselt: "*Die Stellung des Alveolarechinococcus*", *Münchener medizinische Wochenschrift*, Number 12, 1906.

[10] J. Orth: "*Pathol.-anat. Diagnostik*", Berlin, Eighth Edition, 1917, page 390 (*d'après* Posselt).

[11] H. Schmieta: "*Primärer cystischer Milzechinococcus mit secundärer, cystischer Echinokokkose im Milzgewebe*", *Virchow's Archiv*, Volume cclxxxv, Number 3, 1932, page 657.

[12] F. Dévé: "*De l'échinococcose secondaire*", *Thèse de Paris*, 1901, page 39.

[13] F. Dévé: "*La forme multivésiculaire du cyste hydatique. Ses conditions pathogeniques. Ses relations pathologiques*", *Comptes Rendus des Séances de la Société be Biologie*, May 6, 1916; "*Le cyste hydatique multivésiculaire du foie*", *Revista de la Asociación médica Argentina*, March, 1917.

[14] F. Dévé: "*La multisacculation corticale exogène hydatique*", *Annales d'anatomie pathologique*, January, 1930.

[15] F. Dévé: "*Echinococcose du cocur*", *Nouveau Traité de Médicine*, Volume x, Number 19, page 697.

[16] F. Dévé: "*De l'existence de formes de transition entre l'échinococcose hydatique et l'échinococcose alvéolaire chez l'homme*", *Comptes Rendus des Séances de la Société de Biologie*, May 20, 1933.

THE STERILIZATION OF CATGUT.

By C. H. Kellaway and F. Eleanor Williams.

[From the Walter and Eliza Hall Institute, Melbourne.]

The occurrence at another hospital in Melbourne in 1931 of tetanus attributable to infected catgut led Cooper and Williams[2] to investigate the methods of sterilization of catgut in use at the Melbourne Hospital. They found that biniodide sterilization of catgut is ineffective and that a method based upon studies by Bulloch, Lampitt and Bushill[1] is efficient and satisfactory. This consists in soaking the defatted gut for nine days in a solution containing 1% iodine, 1% potassium iodide, 0·25% potassium iodate and 5% glycerine in water. The iodine is washed out by three changes of 70% alcohol containing 10% of glycerine. The catgut is stored in 0·4% mercury biniodide solution in 70% alcohol containing 2% glycerine.

Last year at still another Melbourne hospital and in private practice there were further disasters, and this year yet another tragedy has occurred in private practice in Melbourne. In all these suspicion fell upon catgut prepared by the biniodide method. It is therefore desirable to draw the attention of the profession to the fact that biniodide sterilization of catgut cannot be relied upon, since it is not effective against spore-bearing organisms.

One of us (F.E.W.) has investigated the remainder of the catgut under suspicion in connexion with the accidents of 1933, and it seems important briefly to record the results of these two investigations.

At the hospital where two cases of post-operative tetanus occurred, both patients were operated upon on the same day. At this hospital it was the practice to use catgut from jars labelled with the days of the week, one for each day, and these, together with the day and night "immediate" stock and the reserve stock bottle, were examined.

The method used was to remove the reels of catgut aseptically from the jars, to drain them and incubate them in sterile distilled water for twenty-four hours. They were now transferred to jars containing alkaline meat medium and incubated anaerobically.

Of 45 reels of catgut, three were found to be infected. One of these came from the bottle in use on the day of operation, and in this growth appeared on the eighth day. The deep layers of the meat medium were pink with gas production and digestion, and in the upper layers the meat was blackened. The cultures had a decided "stable manure" odour. Films showed Gram-positive rods and filaments of varying length and

size. Spores were absent. Subcultures were made on peptic agar and blood agar slopes and plates and incubated aerobically and anaerobically. On blood agar plates incubated anaerobically there were two types of colonies, both round and flat with irregular spreading edges. One of these types caused hæmolysis in the medium. The colonies were subcultured into meat medium and Noguchi tubes. Films from these after fourteen days (Figure I) showed Gram-positive rods with round terminal spores, some of which retained the stain. Thicker and shorter sporing bacilli were also seen. A dose of one cubic centimetre from one of the Noguchi cultures was inoculated into the right thigh of each of two guinea-pigs. There was much swelling and tenderness at the site of the injection, which gradually subsided. Both animals died on the eighth day, but unhappily, since this happened during a week end, their symptoms were not observed.

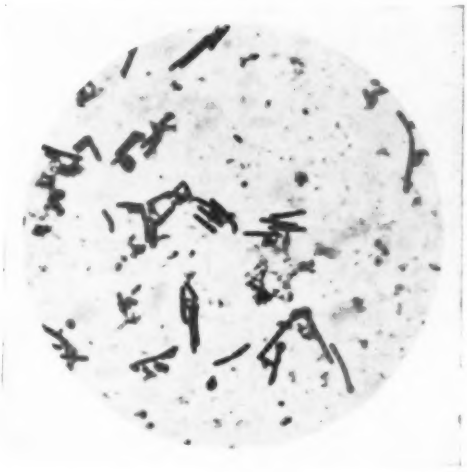

FIGURE I. Film of a mixed subculture of anaerobes in meat medium.

Mixed anaerobes were also grown from one of the other reels, and from a third a pure culture of *Bacillus subtilis* was obtained.

Seven reels of catgut from the private stock of a doctor who had had a patient with post-operative tetanus were also examined. These were a special stock used for one particular type of operation. For his other work this surgeon had discarded gut prepared with biniodide, but regarded this particular stock as safe, since it had been used successfully in a large series of earlier operations. Two of these seven reels were found to be infected.

The methods used were the same as in the other series of tests. The catgut on reel 4 was divided into two parts for test. Alkaline meat medium in which 4 (*a*) and 4 (*b*) were placed, became pinkish in colour, there was some digestion and gas production and the cultures had the odour of putrid cheese. Films stained by Gram's method showed numerous slender Gram-positive rods with round terminal spores and shorter thicker Gram-positive rods with subterminal spores. A few oval free spores were present. In 4 (*a*) there were filamentous forms (Figure II), but in smears of 4 (*b*) (Figure III) there were bacilli with the typical morphology of *Clostridium tetani*, some with spores at either end (dumb-bell).

The medium in which number 1 reel was placed became pinkish in colour with gas production and some digestion and a sour putrid odour. Films stained by Gram's method showed numerous filamentous Gram-positive bacilli with round deeply stained or clear spores at the end of the filaments. There were also some long slender rods with round terminal spores, free oval spores and thick Gram-positive rods with central and subterminal spores.

FIGURE II. Film from meat medium inoculated with infected catgut containing *Clostridium sporogenes* and *Clostridium tetani*, the latter in filamentous forms.

Cultures 1, 4 (*a*) and 4 (*b*) were inoculated into guinea-pigs, which received two cubic centimetres intramuscularly into the right thigh. There was some swelling at the site of injection, which shortly subsided. The guinea-pig which had been injected with culture 4 (*b*) died with typical tetanus on the fourth day; the remainder survived without symptoms. Attempts to cause tetanus in guinea-pigs by concurrent injections of these cultures and cultures of *Staphylococcus aureus* or of solutions of quinine and urethane were unsuccessful.

Attempts to obtain pure cultures of *Clostridium tetani* were unsuccessful. After numerous subcultures the growths were still contaminated by a second anaerobe, *Clostridium sporogenes*, which could

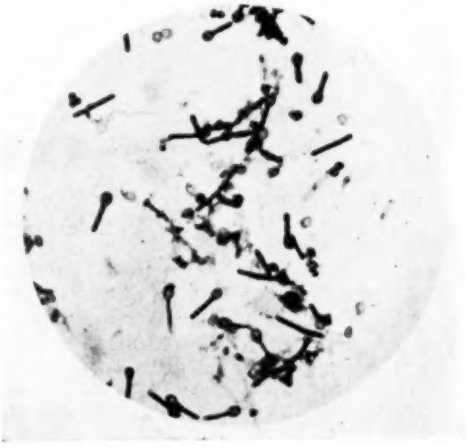

FIGURE III. Film from meat medium inoculated with infected catgut, containing *Clostridium sporogenes* and typical *Clostridium tetani*.

be obtained in pure culture. Though it is usual for washed spores of *Clostridium tetani* to fail to cause symptoms when injected into animals, cultures containing toxin generally give rise to experimental tetanus. The presence of a contaminating anaerobe may have caused destruction of toxin and accounted for the low mortality in our experimental animals. It may also contribute to the low incidence of post-operative tetanus in man, despite the use for so many years of catgut prepared by methods inefficient for sterilization.

Clostridium tetani was isolated in pure culture from a patient with wound tetanus at this hospital. Cultures in meat medium in a dose of one cubic centimetre injected intramuscularly invariably killed guinea-pigs in eighteen hours. Cultures of this organism contaminated with *Clostridium sporogenes* isolated from catgut were regularly less effective, killing in from two to five days.

It is obviously of the first importance that every operating surgeon in Australia should be aware of the dangers of inefficient preparation of catgut. The remedy lies in proper preparations for use of the crude material. Only the best available commercial catgut should be used. This should be submitted to the iodide method of preparation, which has been shown by many accurate workers to ensure sterility, and in our hands did not fail to sterilize catgut heavily contaminated externally with tetanus spores.

REFERENCES.

(1) W. Bulloch, L. H. Lampitt and J. H. Bushill: "The Preparation of Catgut for Surgical Use", *Medical Research Council Special Reports*, No. 138, 1929.

(2) Eric L. Cooper and F. E. Williams: "The Sterilization of Catgut", *Melbourne Hospital Clinical Reports*, 1932, Volume III, page 14.

THE PREPARATION OF CATGUT FOR SURGICAL USE.

By JULIAN SMITH, JUNIOR,
Melbourne.

IT would appear that, in this country at least, some profit might be derived if surgeons in general would consider what measure of security from post-operative tetanus is afforded them by their method of sterilizing catgut for surgical use. This whole question of catgut sterilization has been dealt with very fully by Bulloch, Lampitt and Bushill[1] in their report in 1929 on behalf of the Medical Research Council of the Privy Council. In discussing the relation of catgut to post-operative tetanus, however, they state that "the charge against catgut is chiefly made by the mental process of exclusion". From a critical survey of the literature up to the time of the publication of their work, they concluded that "although there may be a suspicion against catgut, it remains for the most part only a suspicion". In some instances, the doubt appears to have been raised by the failure to isolate the tetanus bacillus from the wound made by the surgeon, and the theory of auto-infection from the bowel has been invoked. In a recent editorial on the question, it was emphasized that even if some form of tetanus bacillus were isolated from the catgut used at the operation, the tetanus following the operation was not necessarily due to the infected catgut. In comment on the case under the observation of Morgan, of Sydney, in which the tetanus bacillus was recovered with ease from the operation field, and in which it was also isolated from the catgut used, it is stated that "it is possible that the catgut caused the infection; this cannot be stated, however, as being proved beyond any possible doubt".[2] Surely this is carrying scientific scepticism a little too far. A surgeon operating on a case of streptococcal peritonitis accidentally pricks his finger. In a few hours he has a rigor and, some time later, a painful finger. A tenosynovitis is present, the tendon sheath is opened, pus is evacuated from which a streptococcus is grown. Surely one is justified in assuming that the infection occurred as the result of the accidental wound to the finger during the operation. One fails to see that the analogy is unfair. If we are to be blinded by science, surely allow a ray of logic to enlighten our darkness.

One has nothing but admiration for the severe scientific discipline which research workers impose upon themselves, and the interpretation of their results, but, despite the assurances which might be offered, could any surgeon, when confronted with a case of post-operative tetanus following a wound of his own making, view the situation with composure? For having looted the human body with his surgical jemmy,

if post-operative tetanus occurs, it surely must be regarded as the marks of his handiwork, and despite the verdict of "not proven" from the bacteriological jury, the surgeon should stand convicted as having been caught with the goods. Even though one may be accused of jumping to conclusions and of not thinking along scientific lines, one holds that post-operative tetanus due to infection from catgut does occur. The following incident may be recorded to strengthen this belief.

The catgut used at most of the public hospitals in Melbourne is prepared by the theatre sisters, and it is their practice to have separate jars of catgut for each operating day in the week. A short time ago,

FIGURE I.

at one of these hospitals, a case of post-operative tetanus occurred. Two days later symptoms of tetanus were observed in another patient. Investigation immediately revealed that the operation on both of these patients had been performed on a Friday and "Friday's catgut" on culture yielded a free growth of the tetanus bacillus.

The essential point in the preparation of catgut for surgical use is to insure its sterility. Many methods, both physical and chemical, may achieve this end when effectively applied, but during their application the strength and physical properties of the catgut may be so altered as to render it almost useless as a ligature.

The problem of catgut sterilization resolves itself into the choice of an effective method that will produce a ligature which is sterile, supple, absorbable within recognized limits of time, and which is not weakened to any great extent during the process of preparation.

The admirable work of Bulloch has shown that the biniodide method, so popular some time ago and still used in many quarters in this country today, must be condemned as utterly inefficient. It was further demonstrated that sterility could be assured by employing a 1% solution of iodine, and Bulloch's suggestions as to the details of this method are well known.

An aqueous solution of iodine first employed by Claudius, who introduced this sterilizing agent, will, in eight days, infallibly sterilize the most infected catgut. The quality of the ligature, however, thus treated, suffers considerably. This led many surgeons to substitute a

FIGURE II.

1% solution of iodine in 99% alcohol. Bulloch showed conclusively the deleterious influence of an alcoholic solution of such strength upon the resultant sterility, and long ago Claudius had shown that iodine had no definite disinfecting action unless water were present in the solution. A 1% solution of iodine in 50% alcohol appears to be quite as effective as a pure aqueous solution and certainly does not produce any great physical change in the catgut. Solutions of iodine containing at least 50% water have the power of penetrating the catgut, and this property would appear to account for the reputation which this solution enjoys as a sterilizing solution.

It is certain that the iodine method in some form is used today more widely than any other. Many minor modifications have been suggested from time to time, not so much with a view to enhancing the sterilizing power of the solution, for this is undoubted, but rather in an

effort to produce a ligature which is kinder to the surgeon than that produced by the original method.

Details of a method originally acquired from the late Professor Yelverton Pearson and published by him in 1909,[3] led my father to employ this method, presently to be described, and he has done so without modification or interruption in usage for nearly thirty years. The good qualities which ligatures prepared in this manner possess, are derived in large measure from attention to minor details during the stage prior to the immersion of the gut in the iodine solution. It will, therefore, be described briefly.

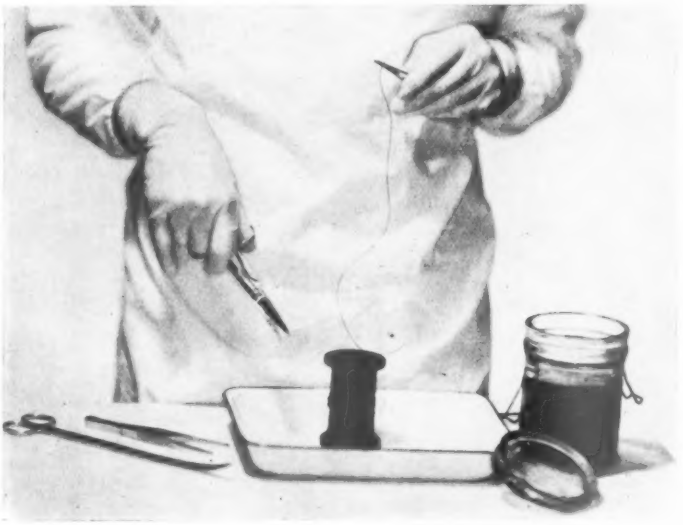

FIGURE III.

In the first place, much future annoyance will be prevented if the surgeon exercises a little care in the choice of the raw material. The reputation of many well-known manufacturers is well deserved, but in general a pale homogeneous catgut is to be preferred to one which is dark and speckled. Suppleness can be assured if the catgut is correctly handled during the next stage.

The gut is usually received from the surgical warehouses in ten foot lengths coiled like a rope. The procedure then frequently employed is to wind the gut on to small glass reels, often under tension. The effect of this is obvious. The gut is wound forcibly against its natural coil and often twisted, and furthermore the glass reels are so small that they cannot accommodate the natural coil of the catgut. When lengths of catgut are cut from these reels, a marked recoil takes place,

making the gut very unwieldly (Figures I and V). If small glass reels are used, the catgut should be very loosely wound in figure of eight.

The method preferred by the writer is to roll the gut loosely (no purpose is to be served by employing tension) on to large wooden reels, which besides receiving the catgut in its natural coil, can accommodate a greater length of material and are unbreakable with ordinary use (Figure II).

When lengths are cut from these reels, no recoil takes place and the material is handled with perfect ease (Figure III). These wooden reels can be made by any wood-turner. Three sizes are used (Figure IV)

FIGURE IV.

to correspond with the three sizes of catgut—"fine", "medium" and "stout". These terms are used to designate gut of sizes "000", "1", and "2 or 3" respectively. No catgut stouter than number 3 is used, and except in rare instances chromicized sutures are not employed. For example, "fine" is used to tie off all subcutaneous bleeding vessels, "medium" for the more important ligatures, such as for the meso-appendix, for suturing the peritoneum in lower abdominal wounds, while "stout" is used, for example, in restoring the sheaths of the rectus muscle after an upper abdominal incision has been made. If a suture of "stout" or "medium" catgut appears to be inadequate for any particular purpose, then it is used double in preference to employing a catgut of larger size.

The wooden reels are first boiled on three successive days for fifteen minutes in soda and are then autoclaved. The gut is then rolled on to

the reels as described (see Figure II), and soaked in ether for one day to insure complete defatting. A stock solution is kept consisting of:

Iodine: 10 parts.
Potassium iodide: 20 parts.
Distilled water: 100 parts.

The sterilization of the catgut begins when it is immersed in number 1 solution, made up as follows:

Stock solution: 2 parts.
Rectified spirit: 7 parts.
Distilled water: 11 parts.

The gut is left in this solution for eight days, and it is then sterile. From this solution it is transferred to a solution of 3% formaldehyde

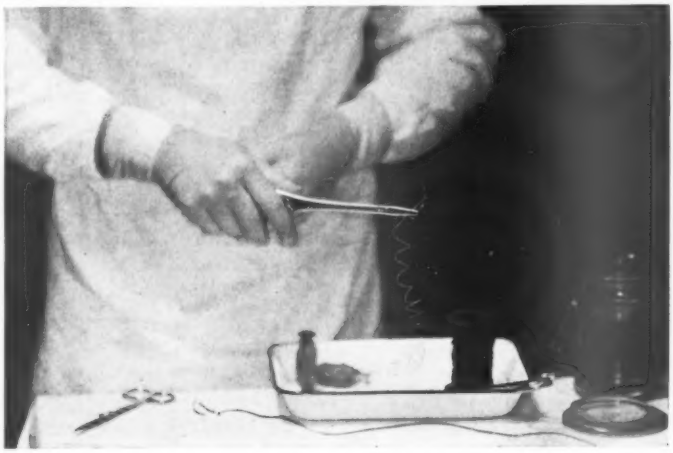

FIGURE V.

(one and a half ounces of formalin to 18 ounces of water) for fifteen hours. It should be understood quite clearly that the formalin plays no part in the process of sterilization, which was completed in number 1 solution. The formalin is used purely to toughen the catgut. The reels are then removed from the formalin and washed in three changes of sterile water. It is then stored in number 2 solution until required. Number 2 solution is made up as follows:

Stock solution: 1 part.
Glycerine: 1 part.
Rectified spirit: 7 parts.
Distilled water: 11 parts.

The occurrence of cases of post-operative tetanus in this State led me to reconsider this method of catgut sterilization and to attempt

to prove its efficiency. There are, in all probability, many means by which catgut contaminated with tetanus spores on its exterior, may be sterilized. The difficulty is to determine with certainty whether any method will prove capable of sterilizing a catgut containing spores in its interior. This difficulty is encountered in any experimental study, for it is quite a problem how to infect the interior of catgut with spores, for this must obviously involve a breach of the surface in the gut. It would appear, however, that a solution (*a*) capable of killing tetanus spores and (*b*) capable of penetrating into the centre of the gut, could be employed with safety.

I am indebted to Miss F. E. Williams, of the Walter and Eliza Hall Institute, for examining bacteriologically the efficiency of the method under consideration. A sample of raw catgut was saturated with an emulsion of tetanus spores, incubated and allowed to dry for three days. Portion of this catgut was rolled on to wooden reels and submitted to the process of sterilization described. It was then incubated in anaerobic meat medium. No growth was obtained. A similar sample of catgut incubated in medium gave a profuse growth of tetanus bacillus. Raw uninfected gut similarly incubated gave no growth.

The washings which were obtained after the stage of immersing the material in formalin were stood for twenty-four hours at room temperature, centrifuged, the supernatant fluid poured off, and the remaining one cubic centimetre of "deposit" was placed in anaerobic meat medium and incubated. No growth occurred. It is therefore evident that tetanus spores are destroyed when the method under consideration is employed.

Samples of "stout" catgut immersed in number 1 solution for eight days were taken and allowed to dry. Thin sections were cut and examined microscopically. The sections were a homogeneous brown colour, no difference being observed in the colour at the centre and at the periphery. It is probable therefore that the solution used does penetrate into the interior of the gut.

A brief inquiry was then made into the effect of the process of sterilization on the strength of the catgut. Samples of raw and treated (that is, sterilized) catgut were submitted to Mr. L. Galbraith, Testing Officer of the Engineering School at the University of Melbourne, and from him the report as set out in the accompanying table was received.

These mean strengths do not appear at first glance to be of a high order, and one wonders why an upper abdominal wound does not break open more often as the result of a coughing attack. The strengths of treated catgut as displayed above should be sufficient to withstand the strains imposed upon it by the surgeon during his knot tying and other manœuvres, if these actions are correctly applied. Although ten pounds may seem a small force and well below the maximum pull of the average pair of human hands, very few surgeons will be able to break a number 2 catgut without considerable discomfort to their fingers. It is interesting to note also that the maximum pull of an average man on a spring balance held at arm's length is under thirty pounds.

In conclusion, one offers no excuse for reopening this question of the sterilization of catgut, which might appear to have passed beyond the realms of useful debate with the publication of the report of Bulloch and his co-workers. The occurrence quite recently of cases of post-operative tetanus in this and other States, the admission that in many of these cases the biniodide method had been used, and the knowledge that until quite recently a large hospital of renown was still employing

Tension Tests on Catgut.

Size.	Treated Catgut.		Untreated Catgut.	
	Strength in Pounds.	Average in Pounds.	Strength in Pounds.	Average in Pounds.
000	5, 4·5, 5.	4·8	6, 5·5, 7, 5.	6·0
0	4·8,[1] 6·5,[2] 8, 7·5.	7·75	9, 11, 10·5, 10.	10·0
1	8, 8, 8·5.	8·2	10·5, 9, 11, 11.	10·5
2	9·5, 10·5, 10.	10·0	12·5, 12, 11 (8·5).[3]	11·5
3	15, 15·5, 16.	15·5	16, 15, 15·5.	15·5

[1] Fracture occurred at a noticeable flaw.
[2] Fracture occurred at a previous grip point.
[3] Ignored in averaging, since well below average.
The average stretch before fracture was about 15%.

the biniodide method, make it perfectly obvious that many surgeons have turned a deaf ear to the heralds of research, or are quite ignorant of a proclamation of great moment. In such a case, surely a happy state of complacence should give way to a feeling of embarrassment. It is surely not idle to reflect that: "An operator would be culpable if a patient of his had died of post-operative tetanus, and he had used catgut that was found to be infected and that was prepared by a method known by him to have been declared ineffective."[4]

REFERENCES.

[1] W. Bulloch, L. H. Lampitt and J. H. Bushill: "The Preparation of Catgut for Surgical Use", Medical Research Council of the Privy Council, Special Report Series, 1929, Number 138.
[2] *The Medical Journal of Australia*, August 4, 1934, page 158.
[3] C. Yelverton Pearson: *The British Medical Journal*, 1909, Volume ii, page 1792.
[4] *The Medical Journal of Australia*, August 4, 1934, page 159.

THE SURGERY OF PROSTATIC OBSTRUCTION.[1]

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In this paper I wish to lay emphasis on two points: (i) new ideas in the pathology and on the mechanism of obstruction at the bladder neck; (ii) new methods of perurethral treatment.

During the last decade attention has been focused on the subject of prostatic obstruction. Great advances have been made in the knowledge of the actual mechanism of the obstruction, and in its treatment. The first step onward was the realization that massive enlargement of the prostate is not an essential condition. Minor degrees of distortion of the bladder neck, where the prostate is smaller than normal, can produce urinary retention. This condition, aptly named by the French *prostatisme sans prostate*, is now being recognized by the general practitioner. The patient with obstructive symptoms, who has a small prostate, is no longer dismissed. His doctor continues the examination to find residual urine.

Surgeons operating on these small glands became dissatisfied with the small amount of tissue removed at operation. Young introduced his cold punch to avoid open operation. During the past few years changes have been so rapid, one instrument succeeding another, with steady improvement in vision and in the method of excision, that the urologist is bewildered and also impoverished as he sees one expensive instrument after the other become obsolete. With the improvement in equipment the scope of perurethral operations has been extended to cover all types of vesical neck obstruction where the instrument can be passed into the bladder.

The new method is now ready for evaluation by surgeons throughout the world. In many reports it is obvious that the enthusiasm of novelty has been allowed to override mature surgical judgement, to the detriment of a great surgical advance. One factor is the knowledge by the public of these new methods. An informed patient sees a way of escaping what to the man in the street is still the dreadful operation of prostatectomy. He will often consent to endoscopic methods only. In comparing any two methods, one must be sure that each is being used for the same condition. The pathology of urinary retention is varied. In the final summing up it will be found that no one method is suitable for all cases.

Function of the Bladder Neck.

Work by Young and Wesson has completely altered the conception of the mechanism of micturition. Briefly stated, the opening of the

[1] Read at the annual meeting of the New Zealand Fellows of the Royal Australasian College of Surgeons, September, 1933.

internal sphincter is not a passive relaxation. It is accomplished by an active contraction of the trigonal muscle. This muscle is a definite anatomical entity. It is derived from a fan-like extension of the longitudinal muscle of the ureter. It lies superimposed on the inner layer of the detrusor, and is carried forward over the internal sphincter to be inserted at the verumontanum. During contraction the trigonal muscle shortens to depress the posterior segment of the sphincter. This action converts the closed vesical orifice into an open irregular triangle. The anterior segment of the vesical neck is held immobile by the strong pubovesical ligaments.

Any lesion involving the posterior segment of the bladder neck impairs its elasticity. To pull it open an extra effort is demanded from the trigonal muscle. This leads to hypertrophy of the trigone. Trigonal hypertrophy then becomes the clinical expression of a particular type of obstructive lesion, that is, one impairing the elasticity of the posterior segment of the bladder neck. To go further, the absence of trigonal hypertrophy eliminates this particular type of obstruction.

For a period the hypertrophied trigone will compensate for the disability. When compensation fails and residual urine appears, hypertrophy of the detrusor is added as a further compensating factor.

ANATOMY OF THE BLADDER NECK: THE SUBCERVICAL GLANDS.

The subcervical glands occur fairly constantly under the mucosa of the postmontane urethra, especially in the region of the internal sphincter. They are similar to the glands occurring under the mucosa of the trigone—the subtrigonal glands. They are submucous and open into the urethra by short straight ducts. The acini dip down into the insertion of the trigone muscle. They are entirely without the true prostatic capsule. When hypertrophy occurs in these glands, the protrusion is covered by mucosa only. It appears as a small rounded nodule, just infrasphincteric. It rapidly becomes spheroidal in shape, and protrudes firstly into the urethral lumen, and then pushes up into the bladder through the vesical sphincter. As its only attachment is by its ducts and its only covering is by mucous membrane, peduncula-tion appears early and becomes a feature that is never lost.

When one remembers that the maximum diameter of the posterior part of the urethra is only one centimetre and the distance between the vesical lip and the verumontanum is but 1·5 centimetres, it is comprehensible that minimum variation in structure can produce maximum disturbance of function. Further, what appears a trifling perurethral operation, can produce benefit beyond belief.

PATHOLOGY OF BLADDER NECK OBSTRUCTION.

An accurate estimate of the pathology of the obstruction must be made before a cure can be proposed. There has been great confusion in the terminology, particularly in relation to the small fibrous prostate. There are three primary divisions: (i) Hypertrophy. (ii) True median

bar formation, a sclerotic process, causing prostatic atrophy from inflammatory fibrosis. The above are as distinct as carcinoma is from each of them. (iii) Carcinoma.

Carcinoma.—Carcinoma is usually, in my experience, a scirrhous type. It may occur at an early age. The origin is frequently in the posterior lobe, but may be anywhere in the gland. Grossly, there are two types: (i) The growth extending toward the mucosa of the urethra and causing early obstructive effects. (ii) The growth remaining intracapsular for a long period, its extension being upward toward the vesicles. Metastasis may occur before there is any dysuria. Carcinoma

FIGURE I. Punch section. Prefibrotic median bar, showing the laying down of a layer of granulation tissue in the submucosa of the postmontane urethra.

was shown in 20% of all prostate sections during the past three years in this hospital. Cancer of the prostate, when clinically recognizable, is, in my opinion, incurable. Operation confers permanent benefit only in that small group in which the gland is removed in the belief that it is innocent. It shells out easily and the malignancy is found by the pathologist in the substance of the gland. Conversely this limited group

provides one objection to the punch method, which must be followed by recurrence.

Prostatic Fibrosis: Median Bar: Small Fibrous Prostate et cetera.—Prostatic fibrosis is the result of an old standing infection. In the earlier stages (pre-fibrotic median bar) there is a subacute inflammatory prostatitis (Figure I). The infection spreads to the subcervical glands, which are in a strategic position to cause trouble in the tissues of the vesical lip. In the submucosa of the prostatic urethra there is laid down a thick layer of granulation tissue. This spreads into the sphincter muscle. Clinically at this stage the posterior vesical lip is raised as a ridge of distinctly inflammatory tissue. The crest of the lip is broad, engorged and is often surmounted by bullous œdema. Dilated and inflamed prostatic ducts are seen. Cicatrization follows with the production of the following features: (i) A chronic quiescent prostatitis. There is an increase in the interacinar fibrous tissue, with round cell infiltration and compression of prostatic acini. (ii) Chronically inflamed, cystic, submucosal glands. (iii) Submucosal fibrosis of the posterior vesical lip and partial fibrosis of the internal sphincter.

FIGURE II. Prostatic fibrosis, median bar.

Clinically, there is now some degree of actual sclerosis of the bladder neck, from contraction of scar tissue. The posterior vesical lip is elevated and pushed forward as a smooth fibrous bar. The internal sphincter is rendered inelastic, and the trigone becomes hypertrophied. A sound passed through the bladder neck gives a characteristic jump as it passes into the bladder. With a posterior urethroscope, the view

into the bladder is partly obscured by the projecting posterior vesical lip (Figure II).

Glandular Hypertrophy.—The actual nature of glandular hypertrophy is not known. An infective origin is proposed by Caulk. After partial operations on the enlarged gland, marked regression in the size of the remaining portion is often seen. It is claimed this is due to the drainage afforded to the infected gland. It is due to the subsidence of œdema and congestion in the prostate, and is well known after suprapubic drainage, where the prostate is untouched.

FIGURE III: Bilateral lobe hypertrophy, entirely extravesical.

The enlargement may originate in the right or left lateral lobe, the posterior commissural tissue, or the subcervical glands. Microscopically the picture is that of an adenoma which in its growth compresses the surrounding prostatic tissue to form a false capsule. It must be remembered that after enucleation of the adenoma, the growth may be reproduced from the prostatic elements in the capsule.

COMMON TYPES OF ENLARGEMENT.

A. *Bilateral Lobe Hypertrophy.*

Whatever size the lobes attain they do not dilate the vesical sphincter, and thus do not enter the bladder. This is the clinical type that fluctuates between complete retention and complete emptying after a few days of catheter drainage. Retention is due to congestion within the gland, raising the intracapsular tension to cause lateral urethral pressure, beyond the power of the detrusor to overcome it. It is a type generally unsuitable for perurethral resection (Figure III).

B. *Solitary Commissural Hypertrophy.*

Solitary commissural hypertrophy arises from the posterior commissural tissue. It may reach surprising growth without hypertrophy of other parts. It forms one variety of middle lobe. It arises within the prostatic capsule and under the trigonal muscle. As it rises into the bladder the protrusion is covered by a capsule and the trigonal muscle. A punch section shows typical hypertrophic tissue lying among large hypertrophied muscle bundles. Since from its position it interferes with the function of the trigonal muscle, it is associated with hypertrophy of the trigone. The tumour is typically sessile with a broad base. It can be enucleated easily from its capsule. This type, when of small or moderate size, is eminently suitable for resection (Figure IV).

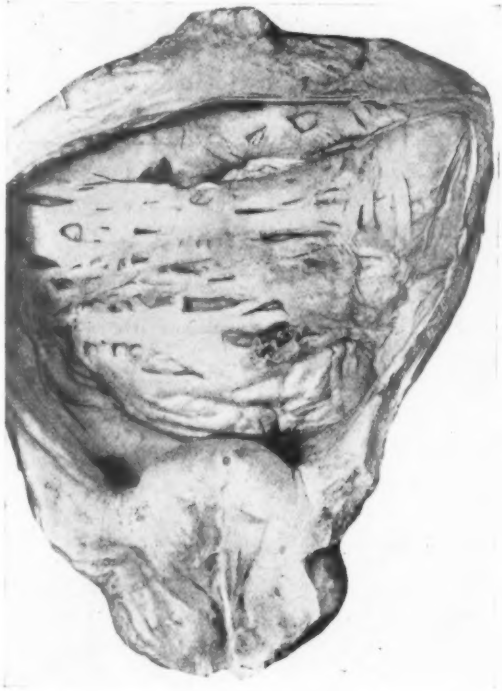

FIGURE IV. Posterior comissural hypertophy, intravesical.

C. *Combination of the Above Two Types: Middle plus Lateral Lobes.*

When the commissural hypertrophy is present it dilates the sphincter to allow protrusion of the lateral lobes into the bladder. This is the common type of large intravesical projection. There are two obstructive factors operating: (i) interference with the function of the trigonal muscle by the middle lobe, (ii) lateral urethral pressure from the lateral lobes. With this type obstruction is marked. Hypertrophy of the detrusor soon becomes replaced by dilatation. Clinically these are the cases with large amounts of residual urine and a dilated and atonic bladder. They require prolonged preliminary drainage. The place of revision in this type is debatable (Figure V).

D. *Hypertrophy of the Subcervical Glands.*

Hypertrophy of the subcervical glands forms then the second variety of middle lobe. From its submucous situation it is ideally situated to cause early obstructive effects. In its early stages it is impossible to diagnose it without a urethroscopic examination. It is typically pedunculated as compared to the stolid sessile commissural tumour. Enucleation is impossible, as the growth is not encapsuled, but the whole tumour is easily removed by clamping its thin pedicle. Endoscopic removal in the early stages is simple. When the projection is larger and intravesical it is mobile and is not so easily dealt with. The punch section is microscopically identical with the previous type, except for the lack of a muscular covering. The patient with this lesion is often uncomfortable on continuous catheter drainage. The bladder makes spasmodic attempts to expel the tumour, if its walls are in contact with it. Better results are obtained by corking the catheter and releasing it at regular intervals (Figure VI).

FIGURE V. Bilateral and comissural hypertrophy, intravesical

E. *Subcervical Gland Hypertrophy plus Lateral Lobe Hypertrophy.*

Subcervical gland hypertrophy *plus* lateral lobe hypertrophy is again an intravesical projection of all three lobes, and is very similar to type C. A large subcervical growth is rarely found without accompanying lateral

lobe hypertrophy. This class, unless of moderate size, is unsuitable for resection (Figure VII).

SUMMARY OF THE GROSS PATHOLOGY IN THIS SERIES OF 100 CASES.

In this series of one hundred cases the gross pathology may be summarized as follows:

Carcinoma, 12%.
Prostatic fibrosis, 30%.
Hypertrophy, 54%.
Type 1, 12 cases.
Type 2, 6 cases.
Type 3, 23 cases.
Type 4, 4 cases.
Type 5, 9 cases.
Post-prostatectomy sclerosis of the bladder neck, 4%.

These figures do not represent a true cross-section of the work. The earlier work was practically confined to median bar cases. The figure for carcinoma is too low. In some cases, clinically malignant, the pathologist was unable to find cancer cells in the punch sections. The figures for the second fifty cases are more representative:

Carcinoma, 20%.
Prostatic fibrosis, 18%.
Hypertrophy, 62%.

The key to success in endoscopic methods is the selection of cases. To select cases an accurate estimate must be made of the pathology on some such system as that outlined above. The operator must have an accurate study and chart of the bladder neck pathology, from both vesical and urethral aspects.

INDICATIONS FOR OPERATION.

Suffice it to say that, in general, with the new method treatment may be undertaken earlier. It is unnecessary to allow the patient to drift on to develop the classical signs of prostatism, with varying degrees of cardio-vascular and renal damage. In considering operation in the case with a large prostate and large residual, one might think that even an inadequate resection would be a relief. However, if a large sterile residual urine is replaced by a smaller infected one, the patient is worse off, and further treatment will be required.

CONTRAINDICATIONS TO OPERATION.

Contraindications to operation may be grouped under three headings:

1. *Chronic Bronchitis.*—In any series of prostatectomies pulmonary complications are a serious factor. They occurred in 20% of our cases, in spite of the routine use of spinal anæsthesia. In the group of resection cases there was one patient only with chest trouble. This is due to the greater mobility of the patient after operation, the absence

of a painful abdominal wound and the shorter stay in bed. It is most important to teach these old men deep breathing exercises, and to make them practise chest expansion before and after operation.

2. *Cardio-Vascular Lesions.*—There is little disturbance and shock in the operation of resection. The strain on the myocardium comes in the period of post-operative drainage, with its possible accompaniment

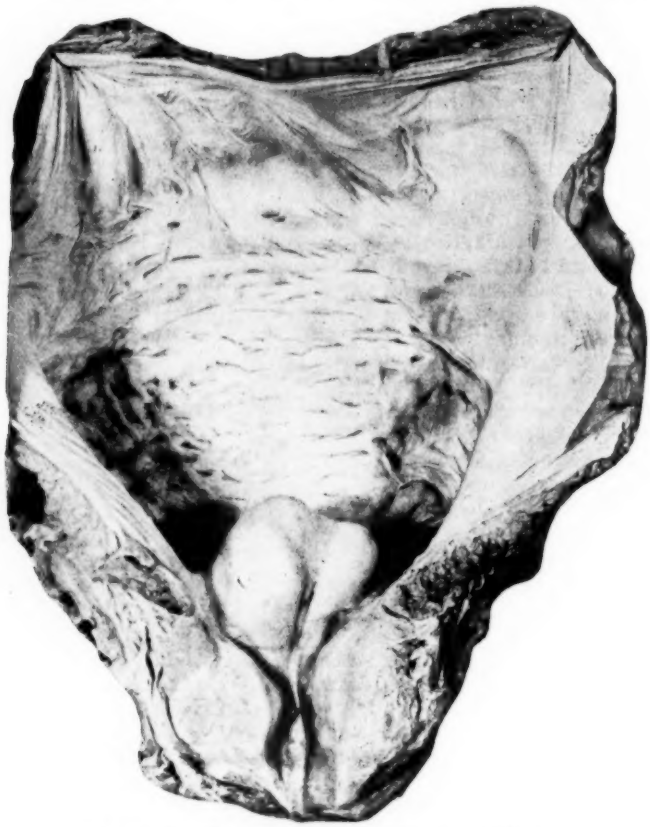

FIGURE VI. Subcervical hypertrophy, intravesical.

of sepsis and toxæmia. Two deaths in this series were due to the poisoning of a seriously damaged myocardium by toxic absorption from only a mild bladder sepsis. The worst risk is the man with a damaged heart and a low systolic blood pressure—say, below 130 millimetres of mercury. The pressure tends to fall at and after operation. The

kidney filter depends for its action on the maintenance of a reasonable blood pressure. Uræmic symptoms may follow a falling pressure. In these cases the pressure must be artificially raised with ephedrine to at least 120 millimetres before operation, and kept above 100 after operation.

3. *Renal Failure.*—Resection may be undertaken in patients with poor renal function when prostatectomy is contraindicated. This does not mean that one may neglect any means of improving the function

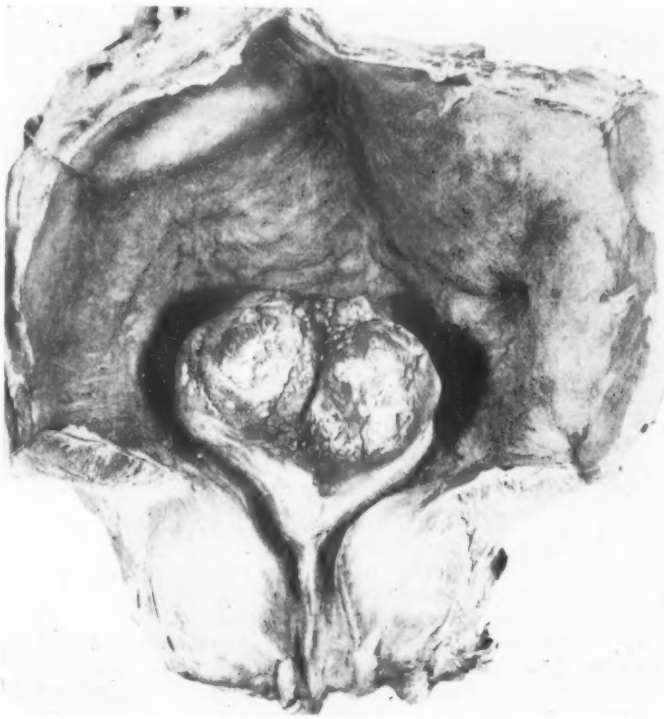

FIGURE VII. Bilateral and subcervical hypertrophy, intravesical.

of the kidney. Pre-operative drainage must be carried out just as carefully in the minor procedure. However, if the function improves and becomes stabilized at a low figure, resection may be done. In this hospital, several of the patients sent out with permanent suprapubic drainage on account of poor renal function, have been readmitted. Resection has been performed and the tube removed. In one man the urea concentration test figure was 0·9% only. The urea clearance test

has now displaced other methods in the estimation of kidney function. What appears a good concentration with the urea test, may be actually a poor output of urea, depending on the volume of urine passed.

CONSIDERATIONS PRELIMINARY TO OPERATION.

The General Condition of the Patient.

In spite of biochemical tests and other physical aids, clinical appreciation of the patient's general condition remains of great importance. His appetite, his tongue and mouth, the day and night excretion of urine, the specific gravity of the urine, must be investigated. Every effort must be made to clean up the mouth. The mental condition is always important. Many of these old men become mentally unbalanced, especially during the evening hours. If this should occur after operation, serious results may follow interference with the drainage apparatus. Mental unbalance usually means latent uræmia, and a further period of drainage is required.

Sepsis in the Urinary Tract.

Sepsis in the urinary tract is of paramount importance in endoscopic work. Post-operatively, one is not afforded the free drainage of a prostatectomy. Every precaution must be taken to ensure a clean field at the time of operation.

Urethral Sepsis.—The posterior part of the urethra has remarkable powers of absorption. Toxic products quickly reach the blood stream from this region. This fact endows the perurethral methods with a constant element of risk. Indwelling catheters should be removed at three-day intervals, and the patient, if fit, allowed up to bath. The urethra should be irrigated before the new catheter is introduced. If severe urethritis occurs suprapubic drainage must be considered.

Bladder Sepsis.—Broadly, there are two important groups of bladder sepsis to consider: (i) that comprising patients with a large amount of sterile residual urine, (ii) that comprising patients with residual urine already infected. Sterile residual urine almost always becomes infected from catheter drainage. The organism is usually a staphylococcus from the skin. Later it becomes mixed with other organisms. Occasionally, in the early stages, the infection reaches the blood stream. Sudden high temperature and chill result. Usually the blood infection is short lived; the organisms disappear from the blood stream within seventy-two hours. In debilitated men the septicæmia may persist and prove fatal.

When the catheter is tied in for drainage, there is a latent period of two or three days. Then organisms appear in the urine, and later pus in varying amount. The urine may not appear very turbid, but the patient has an acute urinary infection. Any added trauma in the way of resection will produce an acute flare up of sepsis. Stress is laid on the insidious nature of this common variety of urinary sepsis. A sufficient period must be allowed in any preliminary drainage for the

accompanying infection to abate. Of course, if the patient is grossly infected with the catheter, the ordinary picture of an acute purulent cystitis is seen.

Briefly, what I am labouring to condemn is the practice of following a cystoscopy by three or four days of catheter drainage and then a perurethral resection. The field is congested, bleeding is increased, and infection is at its height. If a catheter is tied in, resection should not follow for at least one week.

In the second group in which the urine is already infected, the sepsis is apparent and the risk obvious. In many of these cases the infection has been present for months, and the patient is more or less vaccinated against his own organisms. However, he does not tolerate any superadded sepsis. Treatment is directed to clearing up the sepsis by urethral or suprapubic drainage and irrigation.

The Risk of Direct Ascending Infection to the Renal Pelvis.

In many of the cases with larger amounts of residual urine, the ureteric valves are incompetent. In cystograms the opaque fluid may be seen to ascend to the renal pelvis on one or both sides. If the bladder is not kept empty, these patients run the risk of an ascending pyelonephritis (Figure VIII).

The Place and Time of Cystoscopy.

All the patients in this series were subjected to cystoscopy before operation. It is a necessary preliminary, not only to decide whether perurethral methods are suitable, but also to determine the site and bulk of the obstructing tissue. If the examination avoids trauma and is not done in a phase of acute infection, it can do little harm.

Decompression for Retention.

It is safe to withdraw fifteen ounces of urine at once, and five ounces every hour until the bladder is emptied. Our practice is to withdraw ten to fifteen ounces and then to connect a Murphy drip to the drainage system until the bladder is cleared. Once the bladder has been emptied, it must not be allowed to fill again. The urine is probably now infected and there is a risk of ascending infection.

Preliminary Drainage: Urethral Catheter or Suprapubic Tube.

As a general rule catheter drainage is preferred. Suprapubic drainage is required in the following groups: (i) debilitated or toxæmic patients, with low renal function; (ii) vesical calculus or retention diverticulum; (iii) marked infection; (iv) often in the larger adenomatous prostates, where prostatectomy is considered inadvisable.

In general, suprapubic drainage is necessary in the patient who will with any method require a long period of preliminary treatment. It is found that the cases in this class are usually the larger adenomata that have progressed beyond the stage of a safe prostatectomy. Supra-

pubic cystotomy should be avoided in the malignant case if possible. In these cases the sinus is slow in healing and closing, even after an adequate resection. Stress is laid on the value of a suprapubic tube

FIGURE VIII. Cystogram showing bilateral ureteral incompetence.

in the large vascular prostate, where post-operative bleeding may be expected.

SELECTION OF CASES.

The selection of cases reaches the controversial aspect of the subject. Of the last fifty patients with prostatic obstruction admitted to hos-

pital, forty-nine have been treated by perurethral methods. Only one prostatectomy was performed, and that in a man of forty-nine with a large adenomatous gland. The method can be stretched to universal application, but whether this is a wise policy is extremely doubtful. There are certain definite indications for resection:

1. All prostatic fibroses. In my opinion, in performing an open operation in this type of case the surgeon is doing his patient an injustice.

2. Clinically recognizable carcinoma. These cases are incurable by any method. Resection gives a good functional result over a varying period. It may be repeated later if necessary.

3. Small and moderate sized middle lobes, and the smaller combined middle and lateral lobes.

4. Larger hypertrophies when open operation is not feasible. In these cases preliminary cystotomy is often added.

There are certain definite contraindications: the large spongy readily bleeding prostate, and such enlargements as obstruct the free movement of the instrument.

After doing a series of cases of all types and experiencing a few disasters, the surgeon will appreciate the limitations of this procedure. It will never entirely replace prostatectomy. For the patient in good general condition, with a large vascular prostate, open operation is preferable. Many fail to appreciate the advances made in the technique of prostatectomy. With the control of hæmorrhage under vision by suture, and the elimination of packing, the operation has lost many of its terrors.

THE PROCEDURE OF RESECTION.

The McCarthy instrument will be described here. For general use and for those accustomed to indirect vision instruments, it is the most suitable type. The Victor electro-surgical unit formed the power unit.

Anæsthesia.

Low spinal anæsthesia (1·5 cubic centimetres of "Spinocain") was used in all cases. The head of the patient is lowered immediately, to secure a low level of anæsthesia. With these precautions, little trouble was experienced with falling blood pressure. In my experience, spinal anæsthesia is followed by more abdominal distension, but the relaxation at the time of operation is eminently suitable for this work.

Introduction of the Straight Instrument.

In some earlier cases difficulty was encountered in the introduction of the straight instrument. In two patients introduction was impossible and open operation was performed. In another case of a large malignant gland the sheath could not be passed. After a period of two weeks' suprapubic drainage, it passed easily. The chief difficulty is in persuading the instrument to rise into the bladder cavity over a large middle lobe. In one case of prostatic fibrosis, the vesical neck was tight and

unyielding. The instrument could not be passed. A cystotomy was done, and at the operation a small tear was found in the roof of the posterior urethra. In another patient a hæmatoma formed in the scrotum, evidently from a partial rupture of the urethra. Meatotomy is often necessary. Where difficulty in introduction is due to actual narrowing of the urethra, it is wiser to dilate the canal slowly with a Kollmann dilator. In two cases of urethral stricture, resection was carried out after a preliminary internal urethrotomy.

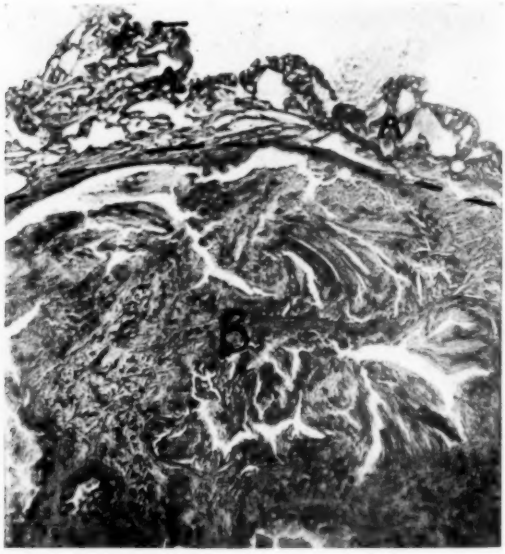

FIGURE IX. Punch section. Prostatic fibrosis. A = Thin line of coagulation. B = Prostatic acini and ducts held in a firm fibrous stroma.

The Resection.

The secret of resection is not in seeing what amount of tissue can be removed, but in locating the actual obstructing tissue and removing that. In most instances the chief factor in retention is encroachment at or near the waterfall or floor of the vesical sphincter. This area in the posterior mid-line should be attacked first. A track is cut out from the vesical aspect of the internal sphincter to a point just short of the verumontanum. Little difficulty is experienced in the prostatic fibrosis type. Here the aim of the surgeon is to remove the bar and to restore the natural angle between the trigone and posterior urethra. In the larger middle lobe it is often difficult to be sure whether the obstruction has been removed flush down to the trigone. In one such case the bladder was opened, after prostatic resection, for removal of a diverticulum. A small flap, the posterior segment of the middle lobe, was still intact. It was very mobile on account of its small size and caused persistent difficulty. Care must be taken not to start the cut too high up on the trigone. A raw area in this region appears a likely starting point for an incrusted cystitis.

The hæmorrhage in the posterior segment is seldom severe. It may be troublesome if the cut approach too closely the verumontanum. There has not been a case of severe bleeding when the resection was con-

fined to the region of the posterior mid-line. All the serious hæmorrhage occurs in the regions of the 4 and 8 o'clock positions. This is well known in suturing the prostatic capsule after enucleation.

In this work the operator must know exactly what his endotherm can do. Too fierce a current produces a clean cut, but little hæmostasis. Too slow a current causes excessive coagulation necrosis. The ideal is a smooth clean cut taking 15 to 20 seconds to complete. In the early cases

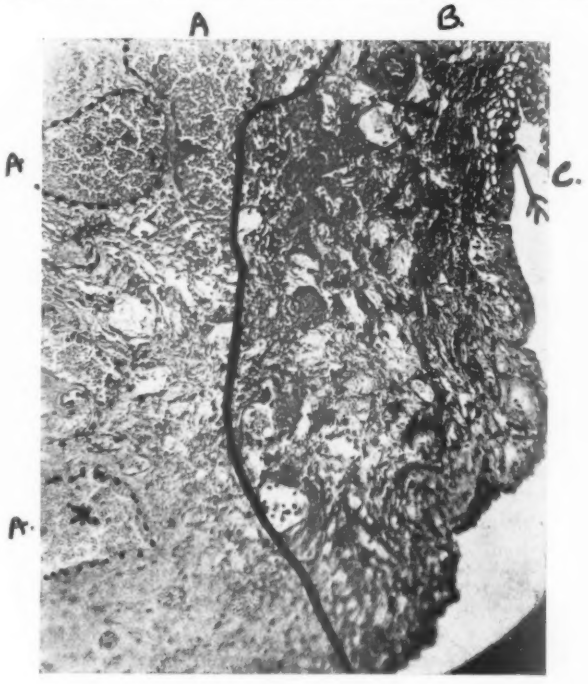

FIGURE X. Punch section. A = Large blood spaces. B = Deep area of coagulation necrosis. C = Air spaces.

it is wise to study the stained sections. The depth of coagulated tissue can be readily seen (Figures IX and X). A narrow, even line of coagulation is desired. When the loop will pass freely up and down the urethra without touching the floor or sides, enough tissue has been removed. Only a few points can be mentioned here on the technical aspect of resection.

Hæmostasis.

The only way to control hæmorrhage is to maintain vision. This means the coagulation of every bleeding point in each cut as it is made. It is tedious but necessary. The tendency is to get on with the cutting and to stop the bleeding later. The field may then be so fogged that it

is difficult to see the bleeding points. There is often a persistent ooze from the cut edge of the vesical mucosa. This is difficult to control. Really severe hæmorrhage may occur in the regions of the 4 and 8 o'clock positions. It may require extensive coagulation to stop this. Deep coagulation is to be avoided if possible. Sloughing must eventually occur, and the powers of absorption of the posterior part of the urethra are well known. It is better to have a little bleeding during the first twenty-four hours than to have extensive sloughing in nine or ten days' time. Separation of a deep slough may cause secondary hæmorrhage after the catheter has been removed. In one such case the bladder quickly filled with clot, requiring an immediate suprapubic operation.

In general, there is little bleeding with prostatic fibrosis and carcinoma. One patient with a malignant prostate had persistent oozing for two weeks. All the trouble is experienced with the adenomata, and the larger they are the more they bleed.

POST-OPERATIVE CARE.

A large whistle tip catheter is tied in the urethra. The catheter must be so placed that both eyes are just within the bladder cavity. Too great an intravesical projection may set up bladder spasm and impede drainage. If there is any oozing the bladder is washed out with hot lotion. The catheter is never clamped, but is placed in a sterile bottle until the patient reaches his bed. It is now that the surgeon is at the mercy of his staff. It requires only a small clot to block the catheter. If this happens and clot forms on the trigone, acute vesical spasm is set up. This stimulates fresh bleeding and the bladder may soon fill with blood and urine. In dealing with the large vascular adenoma, it is now that the value of a suprapubic tube is realized. If the urine is blood stained, practically continuous irrigation is needed to stay the formation of clot. When the drainage is clear, gentle irrigation every four hours is sufficient.

If the catheter becomes blocked and cannot be cleared by irrigation, the surgeon should be informed at once. If drainage cannot be reestablished by change of catheter, an evacuator may be introduced and the clot cleared out. This traffic through the urethra may set up fresh bleeding.

During the past few months a sterile 3·8% solution of sodium citrate has been used. At first it was used to wash out clot. It appeared more feasible to use the citrate to stay the formation of clot. Our present practice is to insert thirty cubic centimetres of citrate solution upon the introduction of the catheter. The tube is clamped and left so for thirty minutes. If the urine is still brightly stained after a wash out with hot lotion, more citrate solution is introduced and left in for another period up to an hour.

This method has greatly simplified the immediate after care. The patient is allowed rest and quiet instead of the bustle and anxiety of continuous irrigations. The citrate solution does not seem to promote any fresh bleeding.

The point cannot be stressed too strongly, that if the surgeon thinks the bleeding is getting beyond his control by urethral methods, recourse should be had to suprapubic drainage. Clot retention will profoundly shock a patient, even though the actual blood loss be slight. In this series the one death from hæmorrhage could have been averted by an earlier suprapubic cystotomy. Trouble may be experienced from loose sections of tissue in the bladder. Usually the cut section adheres to the loop and is withdrawn with it. Occasionally it floats free in the irrigating fluid, and may come later to block the catheter. Every effort must be made to wash out such a loose piece before the catheter is inserted.

Post-Operative Sepsis.

Post-operative sepsis is an ever present menace in these cases. The operator must remember that there is usually a urethral catheter only for drainage. Very mild sepsis and toxæmia will turn the scale in the poor risk. Pre-operative care will reduce early sepsis and operative care will reduce secondary sepsis from sloughing. Post-operative manipulations on account of bleeding greatly increase the risk of infection. The cases may be divided into two main groups:

Sepsis Within the First Week.—Sepsis occurring within the first week is either a flare up of an infection already present, or is introduced at the time of operation. Eleven patients had pyuria and rise in temperature during the first week. In three cases there was an ascending renal infection, with grave general symptoms.

Sepsis After the First Week.—A typical example of sepsis after the first week occurred in Case LVIII.

There was an extensive resection of large intravesical, middle and lateral lobes. Free bleeding necessitated extensive coagulation. On the sixth day the urine was clear and the temperature normal. The catheter was removed. The patient voided urine easily and there was no residual urine. On the eleventh day there was increasing difficulty, the temperature rose to 38·9° C. (102° F.) and the urine was slightly blood-stained. The catheter was reinserted. The temperature remained elevated, and there was evidence of a profound toxæmia. On the thirteenth day the catheter ceased draining with an acute clot retention. Under local anæsthesia the bladder was opened, the clot was evacuated, and free drainage was provided. The bleeding ceased and the urine became turbid with pus. The infection cleared in seven days, the tube was removed, and the patient made a quick recovery. The final result was excellent.

The obvious explanation was a focus of sepsis, under an adherent slough. There was no pyuria until the slough separated, and the hæmorrhage resulted. It shows the wisdom of retaining a little longer in hospital the patient who has had an extensive resection.

Another type of infection occurs when the operation has not been sufficiently radical. Residual urine remains. The urine, in the presence of stasis and necrotic tissue, becomes ammoniacal and infected. Dysuria, toxic absorption and fever result. There have been several cases of this type. The catheter should be reinserted at once. If after a further period of drainage and irrigation the infected residual remains, another resection must be done.

In the treatment of urinary infection there are two cardinal principles: free drainage and the forced administration of fluids. The urinary output must be kept up to one hundred ounces daily, if possible. Hexamine is given as a routine measure, and every effort is made to keep the urine acid with ammonium chloride.

Uræmia.

The operation has little effect on renal function provided the drainage is kept free. Shock and hæmorrhage diminish the urinary output. In the few patients with post-operative uræmic manifestations, infection caused the depression of renal function. There was one death from pyelonephritis and uræmia.

Epididymitis.

Epididymitis occurred in one case only. This is remarkable in view of the traffic through the posterior part of the urethra. The verumontanum and ejaculatory ducts are strictly avoided in the resection. Vas ligation was done in the earlier cases. In the last 70 patients it was omitted without the occurrence of epididymitis.

Incontinence of Urine.

Incontinence of urine followed operation in one case only. Obstruction was due to carcinoma, recurrent after prostatectomy. All the ordinary landmarks in the posterior urethra were obliterated. Partial incontinence followed resection. So long as the operator keeps above the level of the verumontanum there is no risk of incontinence.

Residual Urine.

When the catheter is removed after a successful resection the patient is gratified at the ease of micturition. The bladder empties completely. After two or three days the stream is not so strong, and there may be several ounces of residual urine. This is due to œdema of the bladder neck. It subsides in another few days. The final result can be seen at the end of two weeks. Where the operation has been inadequate there is usually dysuria and residual urine as soon as the catheter is withdrawn. A good result is the abolition of residual urine or its reduction to two ounces.

Causes of Failure.

The chief cause of failure is the removal of insufficient tissue. If the residual urine is abolished, the remains of the prostate shrink. This is the secret of the success of the new method. If residual urine remain, this shrinkage of the prostate does not occur and failure results. All the failures were in the larger adenomatous glands. Further resection can be performed, but an interval of at least two weeks must be allowed.

Diverticulum.

There were several cases of diverticulum of the bladder. In two there was retention within the sac.

In the first patient the pouch was excised at the time of suprapubic drainage, and the prostate was resected later. In the second case a large sterile residual urine was infected by catheterization outside hospital. A simple suprapubic opening was necessary. In the next stage the prostate was resected *per urethram*. Finally the sac was excised. In both these cases, large adenomatous prostates, the result was excellent.

Subsequent Sclerosis at the Bladder Neck.

In no case has there been any sclerosis of the vesical neck from the production of scar tissue. It is remarkable how quickly the resected area heals and the mucosa regenerates.

ANALYSIS OF DEATHS.

Four deaths may be analysed as follows:

M., aged seventy years, was admitted to hospital with acute intestinal obstruction. After a preliminary caecostomy, a carcinoma was removed from the transverse colon. Two days after operation he developed acute urinary retention. A catheter was tied in, but could not be tolerated on account of urethritis. A suprapubic cystotomy was performed. The man was semi-uræmic and very ill at this time. His condition gradually improved, and there was an excellent result from the bowel operation. He was transferred to the Urological Department. The suprapubic tube had been in sixty days. The urine was fairly clear and the renal function had risen from 1% to 1·6%, where it stabilized. The urine contained a moderate amount of pus, and culture showed a pure *Staphylococcus albus*. The pathological report on the prostate was "hypertrophy, type 1, of moderate size". Resection was uneventful, and there was no subsequent bleeding. The output of urine was 50 ounces the day of operation; 111 ounces the next day, and the urine was clear. Later in the third day, when apparently quite well, the patient fell back dead. *Post mortem* examination showed a clean area of resection, but the bladder mucosa was acutely congested. The organs showed toxic changes. There was advanced myocardial degeneration and coronary sclerosis. There was a secondary malignant growth in the liver.

This case illustrates the rapid absorption and toxæmia from a mild bladder inflammation and its effect on a poor myocardium. There was not even time for changes to occur in the urine.

T., aged seventy-three years, was admitted to hospital with a history of dysuria and acute urinary infection. There was a swinging temperature with rigors. A catheter was tied in and he was given free fluids. The urine contained profuse pus and grew a pure growth of *Bacillus proteus*. Consolidation of the left lung base appeared and took ten days to settle down. Cystoscopy revealed a type 3 hypertrophy of moderate size. There were fifteen ounces of residual urine. After a period of sixteen days the catheter was removed and the patient got out of bed. The urine quickly became foul again and a catheter was reinserted. It was necessary to do something to reduce the residual urine in his bladder. The urine cleared after ten days' catheter drainage and a resection was done. In view of his poor general condition the resection was confined to the middle lobe. On the day of operation the output of urine fell to thirty-four ounces and the next day to eleven ounces. In spite of an apparent improvement of his condition, the patient died suddenly on the third day. After operation there was a rise in temperature and the urine became turbid. There was no post-operative bleeding. *Post mortem* examination showed a dilated urinary tract, both renal pelves being hydronephrotic. The cause of death was acute pyelonephritis and uræmia.

Here the preliminary drainage was inadequate and should have been by suprapubic tube. The man was in such poor general condition that it was hoped to get him out of hospital without operation. The urea test figure was 1·8%.

B., aged seventy years, was admitted to a medical ward with a diagnosis of heart failure. There was a history of dysuria, frequency and dribbling. The urine was grossly infected. The electrocardiogram revealed severe myocardial degeneration. After twenty days his heart condition was improved, and he was examined by the cystoscope. There were ten ounces of foul residual urine. The prostate showed hypertrophy, type 3, of moderate size. With six days of catheter drainage the urine appeared clear. The urea test figure was 1·6%. The urine culture showed a mixed growth of *Staphylococcus aureus* and *albus*. A limited resection of the middle lobe was done. There was no post-operative bleeding or rise in temperature. The urinary output was well maintained. The urine became rather turbid on the third day. The patient died suddenly on the fifth day, without apparent cause. *Post mortem* examination was refused on account of his known heart lesion.

R., aged seventy years, complained of dysuria, frequency and dribbling. The urine was clear and the urea test figure was 2·1%. The general condition was fairly good; he had had a slight stroke a year before. The prostate was a very large adenomatous one and there were eight ounces of residual urine. Cystoscopy under caudal anæsthesia was impossible and caused free bleeding. Prostatectomy was advised, but the patient, a clergyman, would not consent to any cutting operation. A catheter was tied in for six days. A second cystoscopy under spinal anæsthesia revealed a type 3 hypertrophy with a very large intravesical projection. The large middle lobe was resected completely and cuts were taken from the lateral lobes. There was very free bleeding, which was partially controlled by coagulation. After irrigation in the ward the oozing stopped. Some four hours after operation the catheter came loose and was pulled out by the patient. It was impossible to reintroduce the rubber catheter on account of spasm. A metal catheter was inserted. This caused fresh bleeding which was controlled by further irrigation. Next day the rubber catheter was tied in, but this change caused more bleeding, which was allowed to go on to acute clot retention. The patient was now in acute pain and badly shocked. An immediate suprapubic cystotomy was done, but he died some twelve hours later. Death resulted more from shock than from actual blood loss.

The first and third cases illustrate the rapidity of toxic absorption from the posterior part of the urethra, and the necessity for adequate preliminary drainage. The second case illustrates the risk of ascending renal infection in a dilated and incompetent tract. The last case was quite unsuitable for perurethral methods. The patient was allowed to have his own way and disaster followed. But for the unlucky accident of the catheter coming out he may have been all right. An earlier suprapubic operation would have saved the day.

RESULTS.

It is impossible to speak of anything but the more immediate results. Time will place this new method in its true place. This report is based on the first 100 operations done with the McCarthy instrument. The first 20 cases were selected because of their unsuitability for open operation. In these cases the bars predominate. The next 80 cases represent all the patients admitted to hospital with prostatic obstruction

except three who had prostatectomy. No patient has been discharged with a permanent suprapubic opening, except the two in whom the punch operation failed, and the one old man with a malignant gland and severe heart failure. Of the failures, one patient had a large malignant prostate and the other was a mental hospital patient.

During the past two years the general condition of the prostatics admitted has been very poor. Owing to the present economic stress, surgeons are finding their patients in the later stage of disease. Very few in this group would have been good risks for open operation.

The immediate results have been good. The patients report each month and the residual urine is estimated. The best results have been obtained in the earlier and smaller hypertrophies, and particularly when middle lobe change was a prominent feature. The results in the larger hypertrophies were satisfactory. Some of these patients retained a moderate amount of residual urine, and some a persistent mild infection in the urinary tract. In many I felt the resection to be inadequate at the time of operation, and yet the patient obtained a good functional result. I still feel that there will be several repeat operations to be done in the near future.

In the post-operative sclerosis group the results were excellent. These cases are especially difficult to deal with in any other way.

The patients with bar obstruction did well as regards improved emptying of the bladder. It must be remembered that these patients have a chronic infection of the prostate and often of the vesicles. A certain amount of discomfort often remains after operation. Further treatment by diathermy and massage may be required.

The patients with cancer did very well both locally and generally. The symptom-free period, however, is very variable. It ranges from six to eighteen months. The operation often seems to retard the progress of the disease, as well as to give local relief.

In three patients the first operation was not sufficiently radical and resection was repeated after two weeks' interval. One man had three operations. There have been three repeat operations in the cancer group within a year of the first resection. There has only been one in the hypertrophy group within the year.

Post-operative complications were slight. There was only one chest complication and that was pre-operative. In the earlier cases especially, hæmorrhage sometimes required strenuous efforts on the part of a very capable ward sister to control it and maintain drainage. There is no doubt that the valve endotherm is inferior to the spark gap machine in effecting coagulation and hæmostasis. Two patients required a suprapubic cystotomy for evacuation of blood clot. There were three cases of severe pyelonephritis.

The average stay in hospital was twenty-three days as against forty-eight days for a similar group of prostatectomy patients. The bulk of this time was occupied by preliminary drainage.

MORTALITY.

The first 60 operations were done with but one death. Some slackness in the strict pre-operative preparation brought an immediate result in two deaths. Both these men were "poor risks" for any operative procedure—one man could not lie down without dyspnœa. However, these patients had inadequate preparation, and a slight increase in the pre-existing sepsis proved fatal. In the last fatal case a prostatectomy should have been performed. In an old man with defective renal function this new procedure can scarcely be termed a minor operation. There is always the risk, firstly, of bleeding and, secondly, of infection. These complications occur in a bladder generally drained by a catheter only. If the new method is not extended to cover cases that are really beyond its scope, it should carry a very low mortality.

CONCLUSIONS.

Perurethral resection is a great surgical advance and has come to stay.

It is not a minor operation, and requires the same pre-operative care as prostatectomy. It is essentially an operation for a specialized team. The post-operative care may require the whole time of a specially trained nurse.

It is the operation of election in all cases of obstruction at the bladder neck except the larger hypertrophies. At present this latter group represents about 30% of all cases. In my hands it is a difficult technical operation to assure a good functional result by channelling a large vascular prostate, and without a suprapubic tube certainly a risky one. In this class of patient prostatectomy has its greatest success both in immediate and late results. My own attitude is to revert to open operation in the larger hypertrophies when the general condition of the patient permits it.

Our hope for the future lies in earlier treatment. Resection is applicable to practically 100% of cases in their earlier stages, with little risk, little discomfort, and a short period of incapacity. If the patients could be seen early and treated early there would be saved many years of misery and ill health. It may require some years of education to achieve this ideal, but one can hope that in the future a urological ward will not remain a collection of old men ruined in health and spirit by the vicious cycle of advanced prostatism.

ACKNOWLEDGEMENTS.

Finally I wish to acknowledge my indebtedness to the work of Professor Randall, of Pennsylvania University. His book, "The Surgical Pathology of Prostatic Obstruction", constitutes a real advance in our knowledge of prostate pathology. Some of the illustrations here reproduced are taken from this work. I also wish to thank our pathologist, Dr. Pearson, for his help with the sections.

CALCAREOUS DEPOSITS IN SUPRASPINATUS TENDON AND SUBACROMIAL BURSA.

By F. J. Gwynne and Douglas Robb,
Auckland.

Opaque deposits of varying shape and size lying between the greater tuberosity of the humerus and the acromion process of the scapula are familiar to radiologists. It was at first thought that they represented calcification in the walls of the subacromial (or subdeltoid) bursa, but it is now known that the great majority are due to deposits in the supraspinatus tendon, though a minority definitely arise in the bursa.[8] This situation in the tendon was first established by Codman.[3] The details of ten cases recently observed in Auckland are given, and then follows a commentary on the condition in general. Seven of the cases (I to VII) present calcareous deposits in supraspinatus tendon, and three (VII to X) calcareous deposits in subacromial bursa.

Case Reports.

Case I.—Unilateral Deposit: Operation During Acute Attack.

Miss M.W., aged forty-five years, was referred by Dr. Elaine Gurr on account of severe pain in the neighbourhood of the right shoulder. Three years previously she knocked her right shoulder on the corner of a desk, but this was a minor injury. For eighteen months she had aching pain in the shoulder, often at night, and particularly after using the right arm freely, as in swimming overarm. This pain was at first slight, became troublesome during a walking tour a few weeks before treatment, and finally became very severe for three or four days, causing her to seek relief. She was employed in a manual telephone exchange, where her shoulder was in constant use. She had always enjoyed good health. Her father and one sister suffered from tuberculosis of the lungs.

On examination the patient was in considerable distress. The temperature was 37·2° C. (99° F.). No abnormality was found in the general examination. The right shoulder region was moderately swollen and very tender, particularly over the anterior aspect of the greater tuberosity. There was no tenderness in the axilla. The swelling appeared to arise under the deltoid, and although the region felt hard, deep fluctuation was suspected. Exploration with a needle in several directions, however, obtained a drop of blood-stained fluid only. This fluid consisted largely of polymorphonuclear leucocytes and revealed no tubercle bacilli. The patient was unwilling to move the shoulder, but 20° of abduction were obtained passively, and later under general anæsthesia 90° were obtained easily. X ray examination by Dr. Bruce Mackenzie revealed a large calcareous plaque just above the great tuberosity. The films were unfortunately mislaid, but the plaque was similar to that in Case II, Figure II, but about three times as large.

Operation.—Thinking that the condition was due to an acute exacerbation of an old tuberculous subacromial bursitis, one of us (D.R.) cut down by parting the anterior portion of the deltoid muscle, with the idea of excising the bursa. No sign of the bursa was recognized, but a mass of tissue largely fibrous, but

partly yellow from desiccated caseous material and partly calcified, was found over the greater tuberosity in the insertion of the supraspinatus tendon. This mass was excised, and a thin shaving of bone was removed from the tuberosity. The latter procedure failed to reveal a focus in the bone for what seemed to be an old tuberculous lesion. The arm was maintained in 90° abduction during convalescence, and a guarded prognosis was given as to regaining of movements.

Course.—The patient went to the country to recuperate, and at the end of three months had regained practically full movement of the shoulder by her own efforts. Eight months after operation she returned in good health and with almost full range of movement. Pain was negligible. The patient had not resumed work up to this point.

FIGURE I. Deposit in supraspinatus tendon, Case II, right side. This shadow was not demonstrable eight months later.

FIGURE II. Deposit in tendon, Case II, left side. This deposit appeared while the patient was under observation, and gave rise to symptoms for the first time a month after it was discovered. Ten months after symptoms, this shadow was greatly reduced in size and intensity, but was recognizable.

Case II.—Bilateral Deposits in Tendon Treated Conservatively, with Disappearance of Deposit on First Side and Diminution of Deposit on Second Side.

Mrs. W.J.T., aged forty-three years, referred by Dr. Gladys Montgomery, had slight disability in her right shoulder for ten years. There were three acute attacks of pain and swelling, ten years ago (the onset), twelve months ago and eight months ago. After being referred, she suffered slight discomfort in her left shoulder for the first time, and one month later had an acute attack of pain in it, similar to those on the right side. The first attack ten years ago was the most severe, and occurred five days after jarring the shoulder by a fall on the outstretched hand. She says the shoulder was swollen and the skin over it shiny. She could not move her arm. In ten days she was much better, and was back to normal in one month. The subsequent two attacks in the right and the one in the left shoulder came on spontaneously. The patient is quite sure

that there was no injury to precipitate them, being rather inclined to associate them with domestic difficulties. She had never been strong, and always had a tendency to "rheumatics". Ten months after she was first interviewed by us for her shoulder condition, her general debility was recognized to be due to chronic pulmonary tuberculosis, with a small cavity. This trouble was thought to have been present about twelve months. The family history was negative as far as tuberculosis was concerned.

On examination the patient was found to be a thin nervous woman. When she was first seen eight months after the third attack in the right shoulder, the only physical sign was slight tenderness over the right greater tuberosity. Movements were full on both sides. The second examination was made on the third day of the acute attack on the left side. The trouble had commenced to subside, but there was very great tenderness over the greater tuberosity. There was

FIGURE III. Deposit in tendon, Case III, left side. (Humerus in external rotation.)

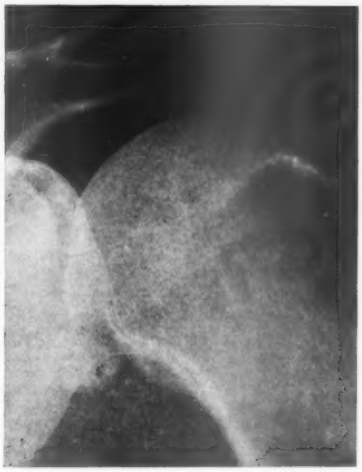

FIGURE IV. Same deposit as in Figure III, hidden by humerus in a different position (humerus in internal rotation).

little swelling. Movements of shoulder were limited, particularly abduction (30° only) and external rotation. The right shoulder was normal.

Treatment and Course.—The calcareous deposit in the right shoulder was discovered at the time of the third attack, on X ray examination by one of us (F.J.G.), and is shown in Figure I. Treatment by Dr. Montgomery included the use of liniments, and later massage, and in a month's time the shoulder was normal. Eight months later further skiagrams were taken. There was no sign of deposit in the right shoulder, but a definite similar deposit in the left, shown in Figure II. It was only after this that discomfort was noted in the left shoulder, and the acute attack developed one month after the deposit was first discovered. The patient declined special treatment, such as diathermy, and the shoulder rapidly improved. Three months later, however, she still complained of pain after major exertion involving the shoulder. Seven months after this again both shoulders were found to be practically devoid of pain and disability and to have full movements. The skiagram showed absence of calcareous deposit in

right shoulder as before, and that the shadow on the left side had greatly diminished in size and intensity, but was still just recognizable (November, 1933).

Case III.—Bilateral Deposits Treated Conservatively, with Diminution of the First and Appearance of the Second while Under Observation.

Mr. R.P., aged forty-five years, was admitted to the Auckland Hospital under the care of Mr. W. C. McCaw, F.R.A.C.S., to whom we are indebted for permission to publish these notes. He was a boiler-maker, lately on relief work. He could remember no special injury to his shoulder. There was sudden pain, with swelling in the left shoulder and inability to use the arm the day before admission to hospital. Neither shoulder had ever troubled him before.

FIGURE V. Deposit in tendon, Case III, right side, showing through shadow cast by humerus (humerus in internal rotation).

FIGURE VI. Deposit in tendon, Case IV, showing subjacent area of rarefaction and condensation in humerus.

On examination the patient's temperature was 37·2° C. (99° F.). He was in some distress with his shoulder, which was moderately swollen. There was very marked tenderness over the greater tuberosity of the humerus. The arm was held in internal rotation; all movements of the shoulder were limited. X ray examination (F.J.G.) on the day of admission to hospital revealed a small calcareous deposit (Figure III), just above the greater tuberosity.

Treatment and Course.—Diathermy was applied, and in three days there was very great improvement, the tenderness being much less. On the second day the patient felt a click in his shoulder on movement, and there was less pain after this occurred. Three months later the deposit was much reduced in size, and two fresh deposits, each the size of a split pea, were seen in the same region of the right shoulder (Figure V). These were positively not present when the patient was first submitted to X ray examination, in spite of films being taken at several angles. There were no symptoms in either shoulder at this stage. Figures IV and

V are included to show how the deposits, in certain positions of humerus with reference to X ray tube and films, may be obscured by the greater tuberosity.

Case IV.—Unilateral Deposit Treated Conservatively.

Miss C., aged fifty-two years, was a patient seen only once by Mr. John Dreadon, F.R.C.S., who kindly gave permission to publish details. For six to nine months the patient, who was very neurotic, had complained of pain and stiffness in the left shoulder. There had been no injury. While she was shopping the pain had increased and she sought advice. There was considerable general pain and tenderness, with limitation of movement in all directions. X ray examination (Figure VI) revealed a characteristic small deposit in the supraspinatus tendon, and immediately beneath it was an area of rarefaction in the head of the humerus, about the size of a split pea. Surrounding the rarefaction the bone threw a denser shadow than elsewhere in the head of the humerus. Conservative treatment was advised, but the patient did not reappear.

Case V.—Unilateral Deposit in Tendon Treated Conservatively.

Mrs. H.M., aged fifty-one years, was a patient of Mr. A. M. Grant, F.R.A.C.S., to whom we are indebted for permission to publish these particulars. At odd times she had complained of pain and disability in left shoulder, and two years ago had strained shoulder muscles through pulling on a rope from a boat. In August, 1933, she slipped and fell on the point of the shoulder. Recovery from the pain caused by this seemed to be satisfactory, but two weeks after the accident the shoulder suddenly became the seat of great pain, with resulting loss of movements.

Radiologically (F.J.G.) at this stage an abnormal oval shadow, ten millimetres by six millimetres, was demonstrated immediately above the superior aspect of greater tuberosity of the left humerus, with localized sclerosis in the underlying humerus. This shadow was regarded as a calcareous deposit in the tendon of the supraspinatus.

Treatment and Progress.—Rest, massage and diathermy were given. In one month pain had disappeared and movements were returning. Full movements were obtained two to three months after the acute attack. Four months later the shoulder was better than at any time since the boating accident. A later X ray examination was not made.

Case VI.—Unilateral Deposit in Tendon: Subsequent Disappearance with Conservative Treatment.

Mrs. R.W., aged forty years, had never had any symptoms referable to either shoulder until June, 1933. She was carrying a tray with a jug of hot water when her feet slipped forward suddenly. She made a violent muscular effort to save herself, but fell heavily on her back. Both forearms were severely scalded. Three or four days after this she noticed pain about the right shoulder, and on X ray examination an oval opacity, four by two millimetres, was seen over the upper aspect of the greater tuberosity. This was thought to be a fragment of humerus avulsed by the fall. Pain continued in the shoulder and the patient was returned to hospital by Dr. M. G. Pezaro, who has given permission for us to see the patient and record this case.

Examination and Course.—Two months after the accident there was tenderness over the outer aspect of the greater tuberosity. There was no wasting. Abduction was free to 80°, after which severe pain was caused. Treatment by movements and diathermy was given, but improvement was slow. Five months after the accident there was still limitation of movement in respect of internal rotation, extension and abduction, the limits of which caused pain. The joint creaked slightly on movement, and there was a little tenderness over the greater tuberosity. X ray examination revealed complete disappearance of the opacity, and no abnormal shadow on the left side.

Comment.—Though the opacity in the skiagram was at first regarded as an avulsed fragment of bone, there was no altered appearance in the subjacent tuberosity. Its non-fusion with the humerus and subsequent disappearance confirmed the opinion that it was actually a calcareous deposit in the supraspinatus tendon.

Case VII.—Bilateral Deposits in Tendon with Acute Attack on One Side Only, Treated Conservatively.

Mrs. K.S., aged thirty-four years, was sent by Dr. Stuart Mackay to hospital under the care of Mr. Morris Axford, to whom we are indebted for permission to publish these details. Without warning of any kind and without injury to the shoulder or fall on the outstretched hand, her right shoulder became very painful and stiff.

Admitted to hospital on the third day of the trouble, she had a temperature of 37·2° C. (99° F.) for two days only. There was no swelling of the shoulder, but it was very painful, and she could scarcely move it. There was tenderness over the outer aspect of the greater tuberosity and very limited movement. The left shoulder was normal. Spontaneous improvement took place, and in three days more most of the pain had disappeared; there was slight tenderness, and full movements were present, except the extremes of abduction and external rotation.

Radiologically, on the right side a small oval deposit, three by two millimetres, was seen just above the greater tuberosity, characteristic of a calcareous deposit in the tendon. On the left side a larger shadow, eight by four millimetres, was seen in a corresponding position. It was less dense than that on the right side, and was irregular in intensity. It was thought to represent a deposit in the tendon also. There had been no symptoms whatever in the left shoulder.

Treatment along conservative lines was adopted.

Case VIII.—Calcification in Subacromial Bursa: Subsequent Disappearance of Shadow.

Mrs. C., aged forty-three years, was a patient of Mr. A. M. Grant, F.R.A.C.S., to whom we are indebted for details of the case and permission to publish them. There were no symptoms whatever referable to the shoulders until two years ago, when the patient awoke one morning with great pain in the right shoulder. Swelling was marked, and for two weeks the patient could scarcely bear to have the region touched or moved. This necessitated rest in bed. The most tender point was over the head of the humerus anteriorly. The patient had always been keen on games, playing badminton and tennis without disability; she was quite unable to account for the onset of the trouble, there being no injury to the shoulder either recent or remote. She had always been healthy, and there was no personal or family history of tuberculosis.

Course.—After the first two weeks improvement gradually took place. Diathermy and massage were given, and later movements to the shoulder. In three months the limb was practically normal, and has continued normal ever since. The patient plays tennis vigorously, and beyond an occasional click there have been no symptoms from the shoulder. Examined recently, the patient is very well, with no symptoms or sign of trouble in either shoulder. Full movements are present in both shoulders.

X Ray Appearances.—The original film (F.J.G.) is reproduced in Figure VII. A large opacity is seen overlying part of the head of the humerus and the whole of the greater tuberosity. It appears to be quite separate from the humerus and has rounded extremities. On account of its large size, its shape and its position, it is believed to represent a calcareous deposit in the subacromial bursa, and not in the supraspinatus tendon. Two years later on X ray examination the shadow had completely disappeared.

Case IX.—Calcification in Subacromial Bursa: Subsequent Disappearance of Shadow.

Miss M.M., aged thirty-one years, was sent to hospital by Dr. J. S. Hudson, and admitted under the care of Dr. T. W. J. Johnson, to whom we are indebted for permission to study this case and publish the notes. The complaint was pain and swelling in the right shoulder, brought on by a month's heavy lifting and work while changing residence. There was definitely no injury to the shoulder or fall on the outstretched hand. Up to this period there was nothing to suggest trouble in either shoulder. She was a thin overwrought girl whose previous health had been good. Her father died at forty-six years of age from

FIGURE VII. Deposit in subacromial bursa, Case VIII. This shadow had completely disappeared two years later after conservative treatment only.

FIGURE VIII. Deposit in subacromial bursa, Case IX. This shadow had completely disappeared fourteen weeks after its discovery with conservative treatment only.

what was probably tuberculosis of the lung. No other occurrence of tuberculosis was elicited in the family history.

On examination, the patient's temperature was normal; the pulse rate varied from eighty to one hundred in the minute. The pain, which had begun as an ache, was now very severe, preventing any voluntary movement. There was great pain on passive movement. Little swelling was seen, but there was acute tenderness over the region of the greater tuberosity. Radiologically (F.J.G.) an opacity, 3·1 centimetres (one and a quarter inches) long by 1·8 centimetres (three-quarters of an inch) wide, with a rounded lower border, was seen. This shadow was applied to the lateral aspect of the great tuberosity, and extended from its upper limit to well below it. There was no shadow near the acromion. On anatomical grounds this shadow was regarded as representing a calcified subacromial bursa.

Course.—The shoulder was rested and diathermy was applied. Recovery was slow. In a fortnight limited abduction was obtained, with considerable pain. In six weeks all movements were free, the last few degrees of abduction causing pain. Twelve weeks later there was a period of about three weeks when painful

clicking occurred on stretching the arms out parallel in front of the body. After that pain completely disappeared, and all movements became full and free. Fourteen weeks after the first X ray examination the opacity had completely disappeared.

Case X.—Deposit in Subacromial Bursa: Conservative Treatment.

Mrs. E.W., aged fifty-eight years, was sent to Hospital by Dr. C. Horton, St. Helier's, for treatment for her shoulder. She was seen by Mr. Morris Axford, F.R.C.S., who has given us permission to see her and to record her case. She had "rheumatic pains" for some years in both shoulders, certain fingers, both knees and both great toes. For a month before she was seen at hospital she had done a great deal of heavy extra work, as she was moving from one house to another. There was no special injury to the right shoulder, but it rapidly became more painful and useless. In the last two weeks she had scarcely been able to move it, and the pain was very great. There was nothing of interest, except rheumatism, in her previous history, and family history was negative as far as tuberculosis was concerned.

FIGURE IX. Deposit in subacromial bursa. Case X.

On examination, the patient was seen to be a stout woman. Her temperature was 37·4° C. (99·4° F.). The left shoulder, several distal interphalangeal joints, both knees and both metatarso-phalangeal and interphalangeal joints of both great toes showed moderate osteoarthritic changes. The tonsils were enlarged and unhealthy. The right shoulder was held immobile at the side on account of pain, but could be abducted 80° passively with difficulty. There was little swelling, but great tenderness was elicited over the lateral and anterior aspects of the greater tuberosity. There was no tenderness over the head of the humerus in the axilla.

Radiologically (F.J.G.), the shadow of a large calcareous deposit, 2·5 centimetres by 1 centimetre (Figure IX), was seen on the upper and outer aspects of the greater tuberosity. The shadow was of uneven density. Its rounded lower border extended half way down the tuberosity. On anatomical grounds it is regarded as a deposit in the bursa and not in the tendon. The left shoulder showed no abnormal shadow.

Treatment was instituted along conservative lines. The result was not yet apparent.

ÆTIOLOGY OF DEPOSITS IN TENDON.

The cause of these deposits is unknown. Repeated mild traumata to the tendon, either in its own length or by compression of it between humerus and acromion, as in falls on the outstretched hand (Carnett[6]), are postulated. Effusion of blood results, with subsequent deposition of lime salts. Some have found definite evidence of necrosis of tendon (Carnett, *loco citato*), while Elmslie[1] quotes Kettle to the effect that

necrosis is not evident, the changes being those of acute and chronic inflammation set up by the calcareous deposit acting as a foreign body. The amount of deposit seems to bear no relation to the frequency or severity of the acute attacks.

The deposit itself is elusive. Mumford and Martin[2] quote Brickner as describing a case in which a deposit appeared in forty-eight hours. Similarly, they quote one case in which the whole deposit was lost in eight days. That the deposits diminish or disappear, with or without treatment, over longer periods is undoubted, as shown in our Cases II, III, VI, VIII and IX. Mumford and Martin state that in every one of their fourteen cases the deposit became less or vanished after conservative treatment. Carnett, however, is sceptical of these miraculous comings and goings, putting them down to varying technique in the taking of the films, whereby a deposit may be concealed in a fresh position of the humerus, and mistakenly regarded as absorbed.

The deposit varies in appearance in different cases and in different regions in the same case. Hard gritty particles or masses, dry soft chalky material, caseous material like that from a sebaceous cyst, and gritty fibrous tissue are all found. Various salts of calcium are demonstrated on chemical examination.

An underlying metabolic factor in the causation of these deposits is suggested by their behaviour, particularly if their sudden appearance and disappearance is believed. Brickner first suggested this and Carnett follows him. Nothing definite is known on the subject.

Perhaps Elmslie's summary[1] puts the practical position most clearly: The nature of these calcium deposits is still uncertain. Nothing similar has been described elsewhere in the body, so it would appear that some local anatomical lesion is responsible for the occurrence. The most obvious suggestion is that of a tear of the insertion of the supraspinatus, with a resulting effusion of blood and some fatty tissue from the interior of the cancellous spaces, that calcification occurs in this, and that the calcareous matter then acts as an irritant foreign body.

ÆTIOLOGY OF DEPOSITS IN THE SUBACROMIAL BURSA.

Regarding ætiology of deposits in the subacromial bursa nothing definite is furnished by our three cases of the condition.

CLINICAL FEATURES.

The marked preponderance of female patients (nine patients out of ten) and the age (commonly from forty to sixty) is in accordance with other series of cases.

Tendinous and bursal cases are very similar in clinical features. The patients come under observation on account of acute symptoms arising *de novo* or following on chronic trouble, or on account of chronic trouble only. Acute cases with little or no previous trouble were commonest in our series.

Acute Cases.—Pain about the shoulder is sometimes excruciating, and is often severe. Only one of Carnett's 45 patients was febrile (37·8° C. or 100° F.). In our Cases I, III and VII the temperature was 37·2° C. (99° F.), and in Case X the temperature was 37·4° C. (99·4° F.). Tenderness is most pronounced over the greater tuberosity, or over a point anterior to this. There is no tenderness over the head of the humerus in the axilla. The patient is unwilling to move the shoulder, but passively 20° to 30° of abduction can often be obtained. On X ray examination a characteristic shadow is seen.

Chronic Cases.—Many patients are free from trouble between acute attacks. Others show all degrees of chronic disability. Aching pain, especially when the patient is tired, and pain on abduction and external rotation are complained of. Local tenderness may or may not be present. Wasting of the muscles about the shoulder is occasionally present.

RADIOGRAPHIC CONSIDERATIONS.

In skiagrams of the shoulder, calcareous deposits in the tendon of the supraspinatus muscle lie in the angle between the humeral head and the acromion process of the scapula. The nodules vary in diameter from a few millimetres to two centimetres. They may be solitary or multiple and usually present a mottled or granular appearance. The apparently solitary shadows have been shown at operation to represent a confluence of smaller deposits. The opacities are not uncommonly bilateral, occurring with or without symptoms and appearing and disappearing in a haphazard fashion.

These abnormal shadows may overlie the head or anatomical neck of the humerus, and may not be identified in the usual films taken with the central ray at right angles to the shoulder joint. This error is avoided if films are obtained under special conditions in suspected patients. If the central ray is directed 10° towards the feet and 10° outwards, the acromion is separated from the humeral head, and the insertion of the supraspinatus muscle on the superior aspect of the greater tuberosity is projected in profile. Deposits near the outer side of the shoulder are seen more readily when the humerus is rotated internally (antero-posterior view of the proximal end of the humerus) and those near the greater tuberosity with the bone rotated externally (lateral view). If the shoulder movements are limited, the patient's body is turned to obtain suitable positions of the humerus. This examination, while preferable to stereoscopy, is not applicable to recent acute cases.

Differential Radiographic Diagnosis.

Discrete calcified areas may occur in the tendinous attachment of the supraspinatus muscle, in the joint capsule into which this tendon is also inserted, in the wall of the subacromial bursa, and in the spaces between these tissues. It is not possible to discriminate accurately in the localization of the radio-opacities in these circumstances.

The subacromial bursa may be filled with radio-opaque material. The abnormal shadow represents a cast of the relatively extensive sac, and offers no difficulty in its recognition (Figures VII, VIII and IX).

In recent trauma the trabeculated fragment is usually less dense and more regular than the calcifications under discussion. An associated defect is visible, with loss of continuity in the lamellar structure of the humerus or acromion.

The sequelæ of past injury, for example, periostitis, *ligamentitis ossificans* and *myositis ossificans*, offer more trouble in differentiation when they affect the tissues in this area, and the diagnosis may not be settled with certainty.

A knowledge of the age of appearance and union of the acromial epiphysis, with its wide range of normal variations, will exclude its being mistaken for pathological calcification in the soft tissues. A persistent epiphysis, so-called *os acromiale*, presents a genuine difficulty. Fortunately it is an extremely rare occurrence.

At times small oval densities are seen in the upper end of the humerus. These "compact islands" cannot be separated from the bone in any projection. They are due to localized interference with normal ossification and have no clinical significance.

TREATMENT.

Deposits in Tendon.

Two lines of treatment have been favoured for deposits in tendon, conservative and operative treatment.

Conservative Treatment.—Conservative treatment consists of rest, radiant heat, diathermy and later movements. This is recommended by some, including Mumford and Martin.[2] These authors had fourteen cases and in no case was surgical treatment called for. The pain always subsided in three to ten days, with diminution or disappearance of the deposit in time. In ten cases observed for more than a year there was no recurrence. All our cases, except Case I, illustrate the effectiveness of conservative treatment, save that in Case II several recurrences took place and in Case VI recovery took a long time.

Operative Treatment.—Operative treatment is strongly advised by Elmslie,[1] who carried it out in seven out of eight cases. He regards is as the quickest way of relieving the pain in acute cases, and the surest cure when the condition is chronic. The time taken for full recovery in his cases varied from two to four months. He exposes the region by drawing back the anterior border of deltoid muscle, and excises all inflamed and calcareous tissue, even if it means opening the shoulder joint. He does not advise curetting. In three out of seven cases he found a small diseased cavity in the tuberosity of the humerus beneath the tendon, as we found radiologically in our Case IV (Figure VI). Carnett[5] is also an advocate of operative treatment. He splits the deltoid, curettes the diseased tissue away, and excises the walls of the cavity. He reports slight changes seen in the bursa, such as thickening,

adhesions and a little fluid, and insists that the deposit is always beneath the floor of the bursa, and may not be seen until the supraspinatus tendon is split. Formerly an advocate for operation in all cases, he now admits the efficacy of conservative treatment, particularly in chronic cases, though he is not impressed by diathermy as a specific measure. He knows of no case of recurrence of the deposit after its absorption or removal by operative measures.

Deposits in Bursa.

No specific views on the treatment of deposits in bursa appear in the literature. Operative removal of the deposit seems a reasonable plan, especially when the deposit is very large. The complete disappearance of a very large deposit in Case VIII under conservative management, however, led to similar treatment being adopted in Case IX with success, and also in Case X.

Summary of Treatment.

The experience gained in dealing with the present small series of cases would incline one to advise conservative treatment in both tendinous and bursal deposits and in both acute and chronic forms. The symptoms subside under such treatment, and there appears to be a considerable chance of the deposit becoming absorbed in reasonable time, and of its leaving no sequelæ. After operation and removal of the deposit a long time passes, two to four months, before the shoulder returns to normal.

REFERENCES.

(1) R. C. Elmslie: "Calcareous Deposits in Supraspinatus Tendon", *The British Journal of Surgery*, Volume xx, October, 1932, page 190.

(2) E. B. Mumford and F. J. Martin: "Calcified Deposits in Subdeltoid Bursitis", *The Journal of the American Medical Association*, Volume xcvii, September 5, 1931, page 690.

(3) E. A. Codman: "On Stiff and Painful Shoulders", *Boston Medical and Surgical Journal*, Volume clxv, 1906.

(4) J. B. Carnett and E. A. Case: "A Clinical and Pathological Discussion on So-Called Subacromial Bursitis", *Surgical Clinics of North America*, Volume ix, October, 1929, page 1107.

(5) J. B. Carnett: "So-Called Calcifying Subacromial Bursitis", *Radiology*, Volume xvii, September, 1931, page 505.

(6) J. B. Carnett: "Calcareous Deposits of So-Called Calcifying Subacromial Bursitis", *Surgery, Gynecology and Obstetrics*, Volume xli, October, 1925, page 404.

(7) W. M. Brickner: "Pain in the Arm, Subdeltoid (Subacromial) Bursitis", *The Journal of the American Medical Association*, Volume lxix, October 13, 1917, page 1237.

(8) Holmes and Ruggles: "X-Ray Interpretation", 1931, pages 174-175.

(9) Alban Kohler: "Roentgenology", 1928.

CULTURAL METHODS IN THE DIAGNOSIS OF SURGICAL TUBERCULOSIS.

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IT is well known that examinations of smears of pus and exudates from tuberculous lesions give a poor percentage of positive results. The search for tubercle bacilli in urinary smears is also unsatisfactory. Until recently, when smear examinations failed, it was necessary to resort to the animal test—guinea-pig inoculation—to obtain more reliable results. This test has the following disadvantages: (i) It is six to eight weeks before a result can be obtained. (ii) If many tests are to be made, large numbers of animals are required. (iii) Of proved cases 10% fail to give a positive result.

During the last three or four years the pathologist has come to rely more on direct culture methods in order to demonstrate the presence of the tubercle bacillus in suspected material. This has been rendered possible by the perfection of a simple and efficient technique and by the improvement in the special culture media used. Using this method, many workers have repeatedly shown that specimens of urine and of pus, suspected of containing the tubercle bacillus, which have given negative results with the smear method on repeated examinations, have with the cultural method given positive results. It can therefore now be definitely stated that the cultural method is of great practical value, and is available for routine use. A short summary of the method, together with its advantages and its results, is given here in the hope that surgeons will appreciate the value it can be in the early diagnosis of surgical tuberculosis.

PRINCIPLES ON WHICH THE CULTURAL METHOD IS BASED.

As the tubercle bacillus grows slowly, it is necessary to destroy any contaminating organisms, if such be present, so that the culture will not be overgrown. This is accomplished by treating the material with sulphuric acid, as advised in the methods of Löwenstein and Sunyoshi. Hohn originally recommended the use of 10% to 12% sulphuric acid. Von Hutte and Lieberthal[1] used a 15% solution in their series of cultures of 300 specimens of urine suspected of containing the tubercle bacillus. Recent work has shown that some tubercle bacilli are of low vitality, and consequently will not withstand strong acid concentrations. It is preferable therefore to use much weaker acid percentages where possible, and accordingly Hohn in his last communications recommends

6% sulphuric acid for specimens such as most urines which are sterile, 8% for slightly infected, 10% for markedly infected and 12% for grossly infected material. (All these strengths are volume percentages.)

TECHNIQUE OF CULTURAL METHOD.

The sediment obtained by centrifugalization, or the pus, is placed in a well stoppered tube with the diluted sulphuric acid of the correct percentage (one or two cubic centimetres of pus to 10 cubic centimetres of dilute acid). The mixture is allowed to remain for about twenty minutes, and it is occasionally shaken. It is then centrifuged and the supernatant acid solution is removed. Cultures are now made from the acid sediment on to any of the various special media which have been devised to promote the growth of the tubercle bacilli. The media of Löwenstein, Petroff, Petragnani or Hohn[2] are most favoured. In my own work I have been accustomed to use the Z egg media of Hohn. This is a recent improvement on the media which he used previously, and contains the following additional substances: (i) Malachite green for the purpose of inhibiting the growth of other organisms; (ii) hæmatin 2% (freshly prepared from blood) in order to enhance the growth of bovine strains of tubercle bacilli; (iii) 10% glycerine in order to improve the growth of human strains of tubercle bacilli.

For each specimen Hohn inoculates three culture tubes.

RESULTS OF THE CULTURAL METHODS.

During 1930 Hohn obtained positive cultures from 211 specimens. His positive results from surgical specimens were as set out in Table I.

TABLE I.

Suspected Material.	Positives: Smear or Culture, or Both.	Positives: Culture Only.	Percentage of Positives: Culture Only.
Urine	68	41	60·29
Surgical material, pus and exudates..	90	62	68·88

Using Hohn's method, I obtained positive cultures from 75 specimens out of 221 routine medical and surgical specimens (taken from patients suspected to be suffering from tuberculosis), and from the ordinary routine surgical specimens I obtained the results that are set out in Table II.

TABLE II.

Suspected Material.	Total Number.	Positives: Smear or Culture, or Both.	Positive: Smear Only.	Positives: Culture Only.
Urine	105	31	1	10
Pus and exudates	25	10	1	7

Occasionally one finds a few acid-fast bacilli in a smear, but when cultured the specimen fails to give any growth. This was the case in one of the specimens of urine in my list above. In the case of the pus specimen positive in smear only the culture was unfortunately spoiled by contamination.

Using Löwenstein's and a modification of Petragnani's media, A. Saenz and D. Eisendrath[3] obtained the results shown in Table III.

TABLE III.

Suspected Material.	Number of Specimens.	Total Positives: Smear or Culture, or Both.	Positives: Culture Only.
Urines	57	30	10

These authors advise neutralization of the sediment before it is cultured, and they inoculate six to eight culture tubes from each specimen. By making smears from the culture every day after the eighth day, they obtain positive results several days earlier than if they awaited the appearance of a visible colony. This search for a "micro" colony, as it is termed, appears to be an excellent method of obtaining earlier positive results and in the future I intend to adopt this procedure. Hohn prefers to culture from the acid sediment, and advises against the use of alkali at any stage, even in the preparation of his media. His results, which are the best so far reported, certainly confirm his contention.

Much discussion has arisen as to the relative value of the culture method compared with the animal inoculation method. The animal test fails in about 10% of known positive cases, and there are many workers who consider that direct culture is certainly equal to, if not superior to, the animal test. After a large series of comparative tests, Hohn concludes as follows: For urines containing much sediment and for purulent fluids the culture method is just as valuable, whereas, for clear fluids or urines with practically no sediment, animal inoculation is probably more reliable.

Among the many advantages claimed for the cultural method are the following:

1. It is much simplier and more economical than the animal test, and can be used for large numbers of routine specimens.

2. In doubtful smear findings the culture gives definite confirmatory results.

3. By the use of Hohn's egg media the bovine strain can be distinguished from the human strain on cultural characteristics alone.

4. Cultures by this method can be made from suspected tissue removed for histological examination.

5. A definite positive result can be usually obtained much earlier than by the animal inoculation method.

As a general rule, colonies appear in about two or three weeks, in many cases earlier, some even as early as the eighth or ninth day.

In my "positives" from surgical material, colonies appeared as follows:

From 1 specimen on the ninth day.
From 3 specimens in 10 to 12 days.
From 8 specimens in 12 to 14 days.
From 19 specimens in 14 to 21 days.
From 6 specimens in 21 to 28 days.
From 1 specimen in 28 to 35 days.
From 1 specimen in 38 days.

With more frequent smear examinations, as recommended by A. Saenz, these times would probably have been shortened.

CONCLUSION.

In conclusion, I can say that, from my own experience, the direct culture of the tubercle bacillus is a reliable method for the demonstration of the tubercle bacillus in pus, urine or exudate, and that I believe it will be found a valuable aid for the early diagnosis of many forms of surgical tuberculosis.

ACKNOWLEDGEMENTS.

To Joseph Hohn, of Essen, I am deeply indebted for his kindness in sending me the details of his method and for the gratifying results which I have obtained by its use.

REFERENCES.

(1) Theodore von Hutte and Frederick Lieberthal: *Surgery, Gynecology and Obstetrics*, Volume i, No. 6, June, 1930.

(2) Personal communication and reprint from *Zentralblatt für Bakteriologie, Parasitenkunde und Infektionskrankheiten*, 1, *Abteilung Originale*, 1931, Volume cxxi.

(3) A. Saenz and D. Eisendrath: *La Presse Médicale*, December 10, 1932, page 1856.

Surgical Technique.

THE TREATMENT OF ANAL FISTULA.

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Incising the whole length of the track and excising sufficient skin and subjacent tissues to make the whole wound saucer-shaped, even with the thighs extended and approximated, will cure almost every *fistula in ano*, provided packing of the wound is carefully carried out. It is almost impossible to treat these cases in an out-patient department at any time during the healing; the packing is neglected or unsatisfactory, and ambulation displaces it and materially delays the healing. Apart from these considerations, an open ulcer in this situation is disabling to the patient.

Even when the patient is treated in the ward, the granulating area frequently takes as long as twelve to sixteen weeks to epithelialize, and this delay leads to a very serious inconvenience to the patient.

To overcome this delay of epithelial growth I have found skin grafting to be the most sure and efficacious method. The period from operation to complete healing can be reduced, in many cases, to three weeks, and rarely is more than five weeks taken.

On about the fifth to the seventh day after operation the base is covered with red granulation tissue and flecks of pus. This is the optimum time to implant the grafts.

An area of skin, prepared by washing with soapy water and wiping over with saline solution, is anæsthetized by a subcutaneous injection of ethocaine. Intradermal injection must not be used; it leads to death of the graft. A sharp curved needle is then inserted into the skin, and the skin is lifted up on the point of the needle. Any half-circle cutting-edged needle in a needle holder may be used, but the Reverdin graft needle is more suited to the purpose. Now with a sharp scalpel or razor (not scissors) a graft is cut of the whole thickness of the epidermis with some connective tissue. To effect this manœuvre the blade must be directed vertically to the skin, not horizontally to it. If the latter movement is used, practically the whole graft will be made up of senescent cornified cells, which, in my experience, do not multiply as readily as mitosing basal cells. The most useful size for the graft is one with a diameter of two to three millimetres; a piece of epithelium of this size derives adequate nutrition for its central cells by diffusion of oxygen and other necessary materials into it.

Now with the eye end of a needle a burrow is made into the granulation tissue for at least three to four millimetres. With this needle still in position, the sharp needle with the graft is passed along it until the graft is at the tip of the blunt needle; this is then pressed against the metal of the sharp needle proximal to the graft. The sharp needle is now withdrawn, the tip of the blunt needle removing the graft from it as they slide on each other. The blunt needle is now slowly withdrawn, the graft being left buried in the granulation tissue. Such grafts are placed at a distance of 0·5 centimetre from the edge and 1·0 centimetre from each other in the centre of the ulcer. The grafts must not be placed in saline solution, which initiates a rapid autolysis in the cells, but transferred directly to the site of implantation.

In about three to four days the growing epithelium will appear on the surface as a bluish-white bubble, and will rapidly spread over the surface. In wounds that have been showing deficient healing with stationary skin edges, as soon as the grafts begin to grow a renewed activity of the edges becomes evident, and they rapidly grow toward the newly engrafted epithelium.

The care most essential for success in this method is the after-treatment. When the grafts have been implanted, a saline dressing in a small piece of gauze is applied and over this strapping is so disposed that the fæces do not run over the ulcer and the performance of toilette is not associated with abrading of the surface. It is of advantage to keep the bowels closed for three to four days; that is, until the epithelium is beginning to appear on the surface. The original dressing should not be removed for twelve to fifteen days.

This method of grafting will be found of great use in almost any position where implantation of skin on a granulation surface is necessary. The grafts are much more certain to grow than Thiersch or Wolff grafts, and are equally efficacious in covering large surfaces. It is essentially that advocated by Wangensteen.

ENTROPION.

By SIR JAMES BARRETT,
Melbourne.

DR. O'DAY'S interesting account of operations for entropion published in the July, 1934, issue makes me venture to describe the modification of the Anagostakis operation devised by Dr. Orr and myself, and published in the local medical journal many years ago.

Like Dr. O'Day, I had visited the Middle East and thought, after witnessing many operations, that this useful operation could be simplified.

A deep transverse cut is made through the skin and the tissues, just above the lashes, and the tissues outside the tarsus are dissected well up. Three gut sutures are inserted through the lower segment, which contains the lashes. These sutures are carried up through the outer surface of the tarsus and firmly tied. Horsehair sutures close the skin wound so that the gut sutures are practically buried. This procedure rotates the edge of the tarsus, but fails to give complete permanent and effective relief. An incision is then made through the edge of the lid behind the lashes from end to end, and is carried well up into the substance of the lid. The outer portion of the lid now slides over the inner portion. The inner portion is now sutured to the lower lid, and is consequently pulled below the outer segment. The sutures are removed when necessary, the catgut sutures remaining the longest time.

This operation combines the principles adopted in the many operations devised, namely, rotation and sliding. It is simple, easy and effective, and can be repeated, if necessary, as nothing is excised.

Case Reports.

DEVELOPMENTAL ANOMALIES OF THE FEMALE REPRODUCTIVE ORGANS, WITH TWO CASES OF PSEUDO-HERMAPHRODITISM.

By KENNETH MACKENZIE,
Auckland.

IT is my intention to record certain cases of genital malformation which have been seen in my practice, dealing with them from the point of view of the clinical problems which they present, and refraining from the discussion of the errors in embryology which have produced them.

Case I: Male Pseudo-Hermaphroditism.

A single man, aged twenty-seven years, was admitted into my ward at the Auckland Hospital on account of a severe attack of lower abdominal pain. He was a farm-hand in a remote country district. Twelve hours before admission he had been found lying unconscious and was said not to have recovered until half an hour after he was picked up. He then remembered that while working he had been seized with very acute pain in the lower part of the abdomen and had had to sit down, after which he remembered nothing. The pain was severe for a further two hours and then eased somewhat.

When he arrived at hospital he was very tender and resistant to palpation in the hypogastrium. It was noted that while the penis was well developed, there was a flat, empty scrotum and a scar in the left inguinal region.

The man then produced a document which he said had been given him by his parents with instructions to show it on any occasion of illness. From this it was found that in 1905, when he was one and a half years old, he was admitted to the Auckland Hospital as a male, by name John, for operation for a left inguinal hernia.

> No spermatic cord was found, but on opening the sac the latter was found to contain what at first appeared to be the testicle with the cord, but on further examination it was found to be an ovary with Fallopian tube, the fimbriated extremity of which was well marked. On drawing on the tube the fundus of an infantile uterus appeared, followed by the other Fallopian tube with its fimbriated extremity, and the other ovary. Externally the reproductive organs are those of a male child, the penis is well developed, the scrotum shows a median raphe. (He was a twin child, the other appearing to be a normal male.)

After this operation the parents were advised that they should consider the child a female, and it was renamed "Doreen". This does not appear, however, to have given final satisfaction, for, when the child was three years old:

> A consultation of the whole honorary staff was held concerning your child, "Doreen" on July 8. The case was then referred to the consulting staff, who met in consultation on July 12. As a result of these consultations I have now to advise you as follows: "That it would be unwise to come to a final decision about the sex of the child at present; but as the private parts have externally the appearance of an imperfectly formed male child, the

medical staff are of the opinion that, as a matter of convenience and propriety, the child, for the present at least, should be regarded as a boy and dressed and sent to school as such. Complications, however, may arise later, perhaps in nine or ten years. About this time the child may develop more distinctly feminine character. A description of the internal parts, as found at operation, I am sending you now. This you should keep for the information of any medical man you may consult."

Far from developing female characteristics the child became a particularly robust male, ploughman and footballer. A diagnosis of torsion of a retained testis was made and the abdomen was opened. No lesion was found to account for his

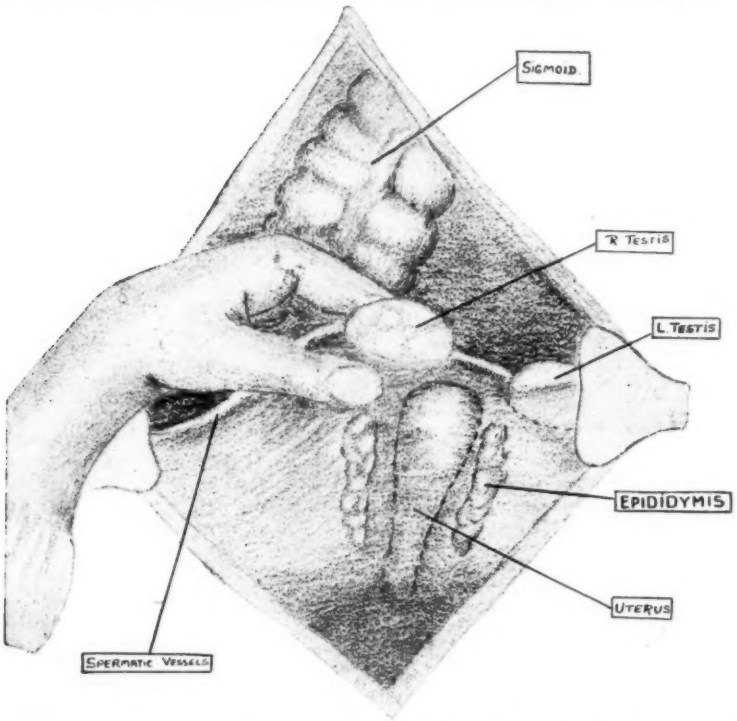

FIGURE I. Case I. The pelvic cavity showing the arrangement of organs. Note the slimness of the uterus and the absence of any sign of Fallopian tube.

acute symptoms, but there was an interesting arrangement of the pelvic organs. Across the pelvis lay a complete broad ligament. In it was an attenuated uterus, more deeply set in than the normal uterus, for the summit of the ligament extended 1·25 centimetres (half an inch) above the fundus. The left sex gland lay close up to the internal abdominal ring, the other almost in the mid-line above the fundus of the uterus. Each had a short mesentery from the broad ligament. The glands were linked together by a well-defined rounded ligament running across the summit of the broad ligament. Each gland had the appearance of a testis, *minus* the epididymis. There was nothing to suggest that ovulation had

taken place from either. Lateral to the uterus a convoluted duct ran downwards in each broad ligament. These were probably in part a loose arrangement of the epididymis and part *vas deferens*.

The peritoneum was incised and the uterus was exposed. It was 8·75 centimetres (three and a half inches) long and 1·25 by 1·8 centimetres (half an inch by three quarters of an inch) in breadth. The peritoneum was not attached to it and was readily turned aside. The uterus was opened. The wall had a

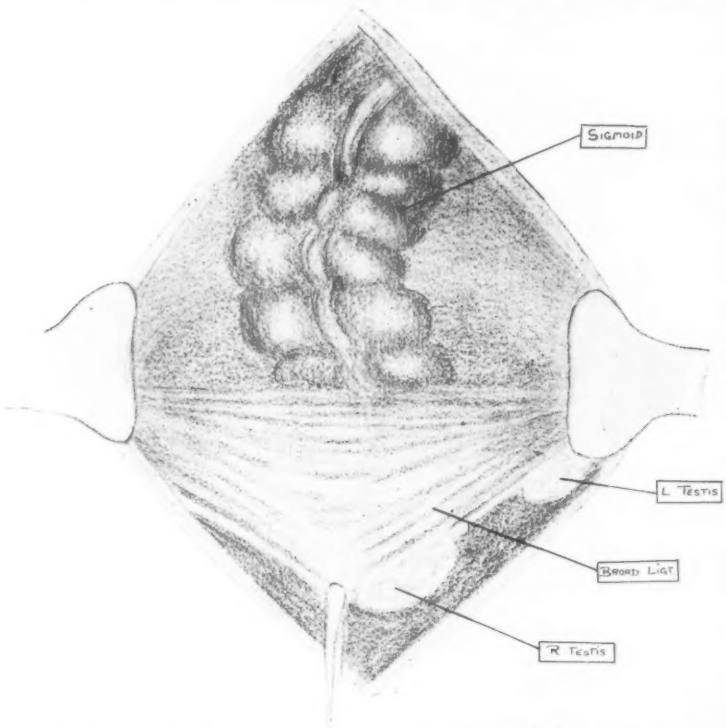

FIGURE II. Case I. Showing the posterior aspect of the broad ligament. The peritoneal layers of this ligament were not attached to the surface of the uterus as in the normal pelvis, but were separated by a loose layer of areolar tissue; hence the non-appearance of the uterus in this back view.

thin muscular layer and a well developed mucosa. There were no contents in the cavity and nothing to indicate that hæmorrhage had ever taken place in the uterus. The cavity extended down to the base of the bladder and probably opened into the prostatic urethra. Tissue was removed for section. That from the gonad was reported as "imperfectly formed testicular tissue and that from the uterus as characteristic uterine muscle and endometrium". The condition is illustrated in Figures I and II.

Case II: Male Pseudo-Hermaphroditism.

In July, 1929, a "girl" of eighteen was sent to me on account of primary amenorrhœa. She had just left school, where she had the reputation of being

quiet and sensible. Her friendships with girls appeared quite wholesome, and she manifested no particular interest in the other sex. She was 167·5 centimetres (five feet seven inches) in height and strongly built. Her face and voice gave a definite impression of femininity. There was no growth of facial hair. The torso was decidedly of masculine type in its muscularity and in the absence of breasts. The nipples were larger than in the average male breasts and had a growth of coarse hairs about them. The pubic hair was very abundant and reached to the umbilicus. In each inguinal region there was a mobile tender "body", imperfectly descended testicles or descended ovaries. There was no sign of hernia. The *labia majora* and *minora* were of normal conformation. The phallus corresponded in size to the penis of a boy of seven. The glans was typically male and covered by a large hypospadiac prepuce. There was merely a dimple at the site of the meatus and from it there ran to the orifice of the urethra, at the normal female site, a narrow glistening band of whiter colour than the surrounding mucosa and obviously representing the dorsal wall of a complete hypospadic urethra. There was a vaginal *cul-de-sac* 2·5 centimetres (one inch) deep, of the diameter of the little finger, and with an intact hymen.

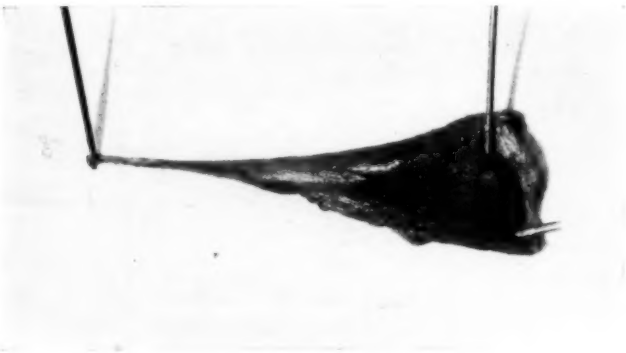

FIGURE III. Case III. Rudimentary Fallopian tube.

A rectal examination was made under anæsthesia and no internal organs of generation could be felt. She had never had menstrual molimina.

Her mother, an intelligent woman, was told that her "daughter" was almost certainly a male. It was advised that as her outlook was so definitely feminine she should not make any change in her mode of living, but that the mother should keep a watch for any development of male sexual inclinations, and seek further advice if they appeared.

I have recently seen this patient again. She is now twenty-three. She is aware of her position as regards sex and accepts it philosophically. In meeting her, nothing suggests that she is not a woman, and her mother tells me that she has received attentions from several young men, but that she always quietly turns them off. She continues in normal friendships with girls. She is very fond of an outdoor life and intends to do chicken farming. She is very good in the use of carpenter's tools, but is also an excellent needlewoman. She enjoys a variety of sports and is good at them. There are no physical changes in the five years except that she is now having to shave daily and that there is something unusual in the timbre of her voice. She says she has no sex feeling either for male or female, that she much prefers that she should continue living as a woman, and this I advise her to do.

Bland Sutton, in his "Selected Essays", states that 95% of pseudo-hermaphrodites are undeveloped males.

Case III: Congenital Absence of One Ovary.

A woman, aged twenty-four years, with one child, was sent to me on account of pelvic symptoms associated with a retroversion of the uterus. She had had no operation prior to my seeing her. A suspension of the uterus was done. It was then seen that while the uterus and the right appendages were normal in conformation, there was no ovary on the left side and only a vestige of Fallopian tube, attached to the uterus and petering out in a tapering point after a course of 2·5 centimetres (one inch). The left round ligament was well developed. The tube was removed (Figure III). The microscope showed that the lumen was unusually small and that the mucosa had practically none of the normal longitudinal folding. The muscular fibres were separated and fragmented and the fibrous elements preponderated.

Ballantyne, in Eden and Lockyer's "System of Gynæcology", writes:

> Cases such as Egger's, in which one ovary is absent, are also rare, and in the few reported instances the ovarian defect has usually been associated with absence of the structures developed from one Müllerian duct, Fallopian tube, one horn of the uterus and part of the upper portion of the vagina, and not uncommonly with absence of the corresponding kidney. Some doubt must continue to exist whether it is possible to have a normally developed uterus in a patient with absence of one ovary.

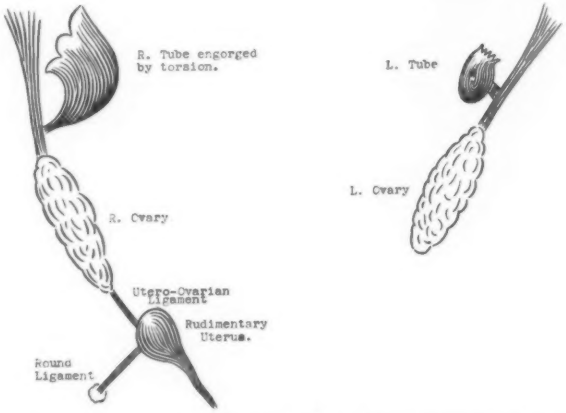

FIGURE IV. Case IV. Scheme showing the arrangement of the pelvic organs.

Unfortunately I did not feel for the left kidney, but this case settles the doubt expressed in the quotation.

Case IV: Absence of Vagina and Part of the Fallopian Tubes. Rudimentary Uterus Torsion of the Infundibulum of the Right Fallopian Tube. Absence of Left Kidney.

A girl of twenty consulted me in 1929 on account of non-appearance of menstruation. Her health was excellent. There were no menstrual molimina. She was a well built, attractive looking girl. The secondary sexual characteristics were well developed. The external genitals were normal in appearance, but there was no vagina and no uterus could be felt.

Two years later there was an attack of acute lower right abdominal pain with vomiting. I saw her after thirty-six hours. The diagnosis was acute appendicitis, but with a reservation in view of her unusual anatomy. At operation it was found that the pelvic cavity was empty of reproductive organs. On each side, above the pelvic brim, was a "primitive" looking ovary, 6·25 centimetres (two and a half inches) in length, half the normal diameter and more tapering than usual, showing numerous small follicular cysts, but no sign of a *corpus luteum*. The left ovary had no inferior attachment, but hung merely from its infundibulo-pelvic ligament. To this was also attached a rudimentary Fallopian tube with unusually well developed fimbriæ. The tube itself was short and stumpy with a rounded and occluded "uterine" end. The right ovary had a well developed utero-ovarian ligament, and a rudimentary uterus, the size of the terminal joint of a middle finger, lay beneath the peritoneum over the bifurcation of the common iliac vessels. The lower end tapered away. A thin round ligament

FIGURE V. Case VI. Hands with thumbs of three phalanges, associated with non-development of the uterus and vagina.

was attached to the right side of the uterus, close to the utero-ovarian ligament, and passed out towards the inguinal canal. There was no sign of Fallopian tube development in contiguity with the uterus. The infundibulum of the right tube was attached to the suspension ligament of the ovary in similar fashion to the left, but it had undergone acute torsion and was œdematous and plum coloured, the ostium resembling closely a sea-anemone (Figure IV). The right kidney was found of double the ordinary size, regular in outline and fixed 5·0 centimetres (two inches) lower than usual in the loin. There was no left kidney. Both tubes were removed.

I have seen this girl again recently. She is now contemplating marriage. She tells me that she has informed her prospective husband of her defective anatomy, but that neither he nor she desires that any operation for the formation of a vagina should be performed. She experiences sexual desire.

I can find no record of a case parallel with this. Ballantyne writes:

> Persons with defect of the uterus, the tubes and vaginal canal (Müllerian derivatives) are occasionally met with. If Fallopian tubes are present when the uterus is absent, they are commonly little more than rods of tissue, with perhaps an abdominal ostium.

But here there was complete development of each infundibulum, then an atresia of both Müllerian ducts, a reappearance of at least one as the rudimentary uterus and again disappearance of the vaginal elements.

Case V: Absence of Uterus and Vagina. Single Ectopic Kidney. Malformation of Thumbs.

A woman, aged thirty-one years, consulted me on account of vague lower abdominal pain. She had never menstruated, was a healthy, attractive looking woman, and had been married for some years. The external genitals were normal, but there was no vagina and no uterus was palpable on rectal examination.

A tender tumour, the size of a fist, was felt in the right side of the abdomen, its centre corresponding to the level of the iliac crest. A pyelogram showed this

FIGURE VI. Hand of a boy showing syndactylism and the adoption of a thumb-like form in the index finger where the middle phalanx has not developed beyond a small wedge of bone. The other hand was fully developed.

to be an imperfectly ascended kidney, but disclosed nothing abnormal to account for the tenderness. Only one ureter, the right, was found on cystoscopy, and the absence of the left was confirmed by chromocystoscopy.

This woman showed another curious anomaly. In place of the thumb on each hand was a digit of three phalanges, identical with a finger in appearance, but having the full power of apposition as a thumb. This deformity is an annoyance to her in the matter of gloves, but an advantage in piano-playing (Figure V).

As a contrast to this hand, I picture the hand of a boy in whom a reverse phenomenon has occurred. The index finger in this case is thumb-like in character—the bone of the second phalanx had not developed beyond a wedge-shaped fragment with a 1·25 centimetre (a quarter of an inch) wide base on the ulnar side, throwing the terminal phalanx out of alignment (Figure VI).

Case VI: Uterus Bicornis Unicollis. Carcinoma of One Corpus.

In 1921 a woman of seventy consulted me on account of slight vaginal bleeding over a period of two months. She was very stout and the uterus could not be felt. Diagnostic curetting was done, and the scraping showed no evidence

of malignant disease. The curetting was repeated, suspicious material was obtained, and the pathological report was glandular carcinoma. At operation two uterine bodies were found, the right one longer and thicker than the left. Hysterectomy was done. The carcinoma was situated in the right uterine body.

This woman had had five children without any difficulties in parturition.

Case VII: Atresia of the Middle Third of the Vagina. Hæmatocolpos.

A girl, aged sixteen years, was sent to me in November, 1928, on account of the non-appearance of menstruation. She had for eighteen months been suffering from periodic pelvic pain, but this had never been severe. She was a healthy girl with well developed secondary sexual characteristics. The external

FIGURE VII. Case IX. Showing the anal laxity due to defective development of the sphincters.

genitals were normal. The hymen was absent and the vagina was only 1·8 centimetres (three-quarters of an inch) in depth. From the rectum a globular median pelvic tumour of 6·25 centimetres (two and a half inches) diameter was felt.

The vaginal *cul-de-sac* was incised and a dissection was carried upward for 5·0 centimetres (two inches) between the bladder and rectum. Gauze was packed into this space. The abdomen was then opened. The tumour was found to be the distended upper part of the vagina. It was opened and dark fluid blood was evacuated. The uterus and tubes were not involved in the distension. A dissection downwards exposed the gauze pack. The lower margin of the upper part of the vagina was stitched to the gauze and the abdomen was closed. The upper part of the vagina was then drawn down to the lower and the two were sutured together.

The patient consulted me again in November, 1929. Menstruation had been regular and painless from the time of the operation until July, since when there had been complete and painless amenorrhœa. There were all the evidences of a four and a half months' pregnancy. The vagina was strictured to a diameter of 6·0 millimetres (a quarter of an inch). Three weeks later she developed severe symptoms of toxæmia and shortly afterwards miscarried. The stricture offered no appreciable obstacle to the delivery.

In September, 1930, she again reported. Menstruation was regular and she was free from symptoms. There was a narrow stricture, but no menstrual accumulation. A dilatation up to 1·8 centimetres (three-quarters of an inch)

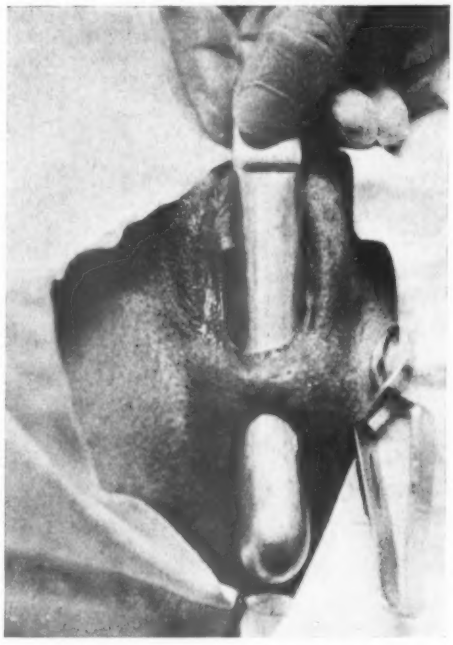

FIGURE VIII. Case IX. Showing the wide channel between the vestibule and the anal canal. The "perineum" appeared to be composed of little more than skin and mucous membrane.

diameter was done. Since then she has reported at yearly intervals. The stricture remains stationary at 6·0 millimetres (a quarter of an inch) diameter, and no further dilatation has been done.

Case VIII: Anus Vulvalis.

A woman of thirty-four was sent to me after her first confinement because her doctor thought that she had received an unusual perineal injury during delivery. There was no sign of injury but the condition of *anus vulvalis*, the anus opening just within the vagina. There was no sign of an anal dimple at the normal site. When the state of affairs was explained to her, the woman said that

her mother had told her that, when she was a baby, something wrong had been noticed in that region, but as there had been no trouble she had almost forgotten it. Fortunately, the sphincter mechanism was effective, though she admitted that she had to exercise care after taking aperients.

Case IX.

As I was preparing this paper a woman of twenty-five consulted me on account of abdominal pain of a week's duration and the appearance of a tumour

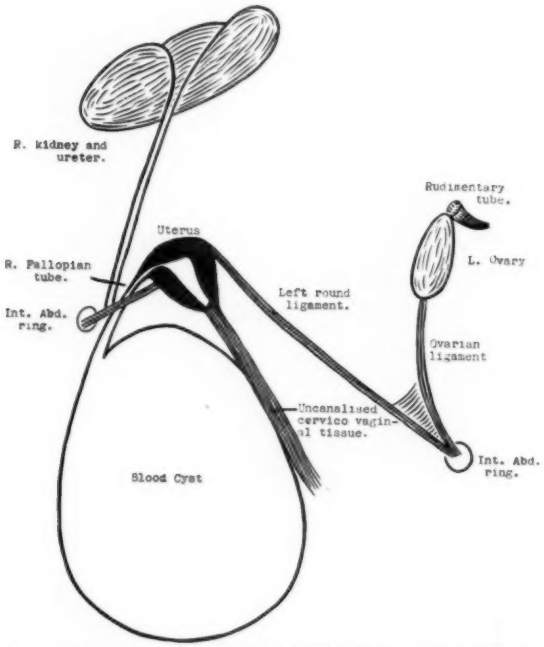

FIGURE IX. Case IX. Scheme showing the arrangement of the pelvic organs.

in the lower part of the abdomen. Her health had always been good, but she had never menstruated, though there had been monthly molimina. Her present attack of pain had commenced during a "period". Her mother had taken her to a doctor when she was sixteen, and had been assured that things would come all right. The mother had died soon after that, and the daughter had not sought any further advice.

The abdominal tumour was of the size and shape of a four months' pregnancy. Its outline was uniform, but for an excrescence on its right side. The vulva was normal in appearance, but the perineum was very narrow and the anus was unusual (Figure VII). There was the natural corrugation of the skin behind, but none in front. The anus was patulous and the mucosal lining was visible in front. On palpation there was found to be very little grip on the anal sphincter, and its action appeared to be more that of a contracting horseshoe shaped band than of a ring. There was no vaginal orifice, and from the vulva the finger

passed back through a wide channel beneath the "perineum" into the rectum (Figure VIII). The rectal finger did not reach the pelvic tumour till it had passed up for 5·0 centimetres (two inches). As it was obvious that no exploration should be made from below, the abdomen was opened. There was a dark brown staining of the omentum and of the pelvic peritoneum by altered blood, but the route of escape of this blood from the uterus could not be found. The tumour was a thin walled cyst (Figure IX). Low on its right side lay a small uterus. The right tube could be identified running backward and fusing with the cyst, but no right ovary could be found. There was no broad ligament on the left side. The left ovary lay at the brim of the pelvis. At its upper pole there was attached a rudimentary Fallopian tube, the small infundibulum sessile on the ovary and

FIGURE X. Case IX. Showing the small uterus above the cyst, with the right tube coming off from the uterus and running into the cyst. On the face of the cyst is seen the whiter split band of uncanalized tissue running down from the uterus.

the tube itself passing to the left for 2·5 centimetres (an inch) and then tapering away. From the lower pole of the ovary a ligament passed to the internal abdominal ring, where it joined the left round ligament, which was greatly elongated by its passage across the tumour to the uterus. The right round ligament was unusually thick and had a course of less than 2·5 centimetres (an inch) from the uterus to the abdominal ring. The cyst was opened and about a litre of chocolate coloured fluid was evacuated. The uterus and the cyst were removed, not without difficulty, for the right ureter lay in very close relation. The right kidney lay just above the common iliac vessels, its long axis transverse, its hilum towards the diaphragm and the ureter passing downward across the front of the kidney. The left kidney was in its natural site, but had a well marked hour-glass constriction. Examination of the organs removed showed a small *corpus uteri* with undistended cavity containing just a trace of blood. There

was no cervical canal and the only outlet from the uterus was by the right tube, the uterine end of which was of natural size and would allow the passage of only a fine wire. Further out the tube, widened more than normal, was closely incorporated into the cyst wall and finally opened into the interior of the cyst, the opening with rugosities representing fimbriæ lying flush with the lining. On the mesial side of the cyst a cord of dense tissue passed downwards from the uterus for 7·5 centimetres (three inches). Its situation suggested non-canalized Müllerian tissue (Figure X and XI).

The pre-operative diagnosis was naturally hæmatometra and hæmatosalpinx consequent upon atresia of the vagina. Operation at once showed the error of this. There was neither dilatation nor hypertrophy of the uterus. The only exit from the uterus was through the minute internal opening of the right

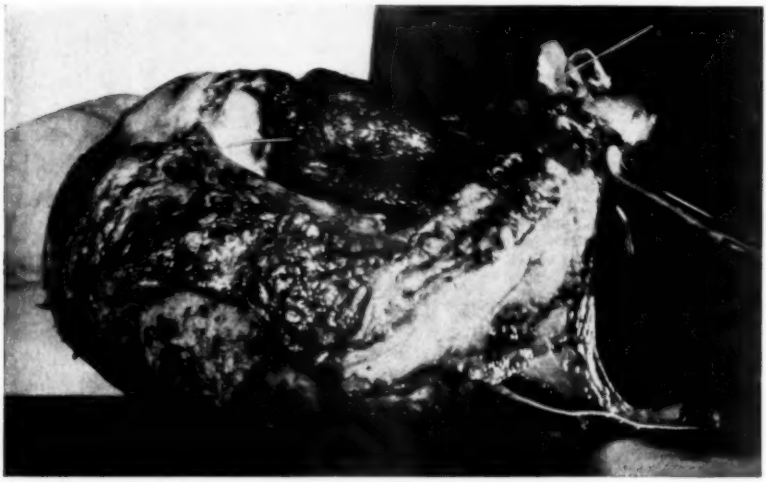

FIGURE XI. Case IX. Both uterus and cyst have been laid open and a probe passed to show the course of the right Fallopian tube from the uterus to the interior of the cyst.

Fallopian tube. The tube was not dilated appreciably in its course and opened by a fimbriated ostium into a great blood cyst. No sign of a right ovary could be seen.

Where was the blood effused? It is natural to think that it came from the uterine mucosa at each menstruation, passed along the tube and was stored in a steadily enlarging reservoir. The narrowness of the uterine exit makes this difficult of belief, but if it were so, how did the blood sac originate? The presence of the fimbriæ shows that it is not a dilatation of the infundibulum of the tube. Can the right ovary have disappeared as an organ in the formation of the sac and its remnants be incorporated in the sac wall? The free opening of the tube into the sac would seem to preclude this theory. Then can the condition be one of pelvic hæmatocele, in which an adventitious wall has formed round the blood first effused and has distended with each addition to the blood content? I do not think so, for there were no adhesions about the sac, the wall was very definite and the sac was removed intact.

I find myself unable to offer any satisfactory explanation of this unusual condition of affairs.

A RARE ANOMALY OF THE SAPHENOUS AND FEMORAL VEINS, WITH A NÆVOID CONDITION IN CERTAIN DERMATOMES.

By W. E. A. Hughes-Jones,
Melbourne.

R.S., a healthy male, aged twenty-six years, presented himself at the Melbourne Hospital because of a painful pigmented area 2·5 centimetres (one inch) in diameter on the inner side of the right leg 7·5 centimetres (three inches)

Showing the great vein crossing in front of the pubis.

above the ankle. Some years ago the skin at that site had been broken by trauma and the subsequent healing was normal. He stated that a large vein had been present high in his thigh since birth.

Below the knee the veins on the inner side and back of the right leg were varicose and the painful area was pigmented, depressed and smooth. The internal saphenous vein was just visible and easily palpated as it coursed along the inner side of the thigh toward the *fossa ovalis*. At the fossa it joined a very large vein which came forward from the deep tissues of the thigh immediately lateral to the upper end of the saphenous vein (Figure I). The common vein, which was large, sinus-like and the size of a man's thumb, ran upward and inward to

cross the front of the *symphysis pubis* and then to course downward to end in the left femoral vein at the *fossa ovalis*.

On the right thigh and right buttock a finely nævoid condition of the skin was limited to certain dermatomes (Figures II to V), which corresponded closely to Foerster's[1] definition of the second lumbar and third sacral dermatomes (Figures VI and VII). The skin of the remainder of the leg was normal. There were no abnormal veins and no varicose veins in the left leg and no nævoid areas

The nævoid areas are outlined, demarcating the second lumbar and third sacral dermatomes.

except for the faintest scattered markings in the third sacral dermatome. Pulsation of the femoral artery was normal in both groins. No veins were visible in the abdominal wall.

Comment.

The right external iliac vein was most probably absent. Anomalies of the vascularity of the skin often point to the presence of deeply seated vascular anomalies, of which Lindau's disease is a good example. It is a matter of speculation whether the nævoid dermatomes and the absence of the external iliac veins were related or independent anomalies, although it is attractive to postulate that the superficial and deep venous and capillary systems in a particular spinal segment have gone astray. Professor Wood Jones thinks there is no relation between the two conditions. The writer has not found a record of a similar case, the arterio-venous anomaly described by De Takats being quite different.

Reference.

(1) O. Foerster: "The Dermatomes in Man", *Brain*, Volume lvi, Part i, 1933, page 10, Figures XIV, XV, XVI and XVII.

The nævoid areas are outlined, demarcating the second lumbar dermatome.

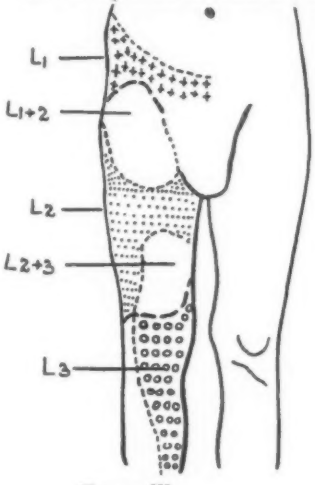

FIGURE VI.

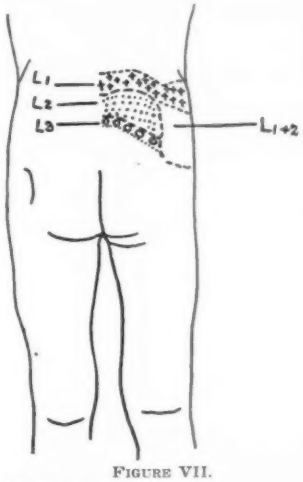

FIGURE VII.

The dermatomes of the thigh (after Foerster).

CONGENITAL SOLITARY KIDNEY.

By H. A. PHILLIPS,
Melbourne.

CASES of congenital unilateral renal agenesia, especially when complete (true congenital solitary kidney), never fail to arouse the interest of the anatomist, and when associated with other congenital defects or superimposed renal pathological states needing systematic investigation, demand no little consideration by the urological clinician.

FIGURE I. Showing specimen from the front. Probes in left ureteric orifice and internal urethral meatus.

The condition is not to be confused with the horseshoe kidney, the sigmoid kidney, or the shield type of ectopic kidney; in these conditions the two kidneys are actually present, though fused to form one mass.

The case to be reported illustrates a congenital solitary kidney affected by tuberculosis. The presence of a knot of rudimentary renal tissue on the other side does not affect this designation, for the rudimentary ureter on that side had never been patent and had an ectopic attachment to the *cervix uteri*. The renal vessels on that side, too, were completely absent. Other defects present included complete duplication of uterus, cervix, and vagina, ectopic ureteral implantation as mentioned above, the presence of a congenital vaginal cyst (of Gärtner's duct) and a unicornuate bladder which may or may not have resulted from the tubercular ureteritis.

Clinical History.

A female patient, aged thirty years, single, complained that for eighteen months she had had recurrent attacks of cystitis. For eight months she had had increasing pains in the left side, and for three months very marked frequency of micturition, which was always painful and often uncontrollable. For thirteen weeks there had been amenorrhœa, menstruation previous to that having been very regular.

Cystoscopy without anæsthesia was impossible on account of pain. Under anæsthesia, however, an intense cystitis was found to be present, the left ureteric orifice was very retracted, and a diagnosis of left renal tuberculosis was made. The right ureteric orifice could not be found, and when methylene blue was injected intravenously, "no dye came through either ureter". No details of the right side of the trigone could be made out on account of the œdema.

It was thought the right kidney was also affected, and that the orifice would have been found had a longer search been made. The left ureteric urine contained tubercle bacilli. On the following day the patient developed uræmia and died.

FIGURE II. Showing vagina opened to show septum, vaginal cyst and didelphic uterus, viewed from behind.

Pathological Findings.

Autopsy revealed an old tuberculous lesion of the right lung apex and gross pathological genito-urinary changes, death being due to renal tuberculosis.

The left kidney was enlarged to a length of 12·5 centimetres (five inches) and weighed 219 grammes (seven and three-quarter ounces). Three-quarters of its substance was involved in caseous tuberculous processes. The ureter was thickened rather than dilated, and entered the bladder by a golf-hole orifice, the bladder being thereby converted into a cornuate organ. The right half of the trigone and the right ureteric orifice were absent.

There was no kidney in the right loin. Lying in relation with the right common iliac artery, however, was a small knot of tissue about half a centimetre in diameter, which was connected by a solid ureteric cord to the right side of *cervix uteri* (see Figure I). The left renal vessels were hypertrophied. There were no right renal vessels from the aorta or iliac arteries. Both suprarenals were present in their normal position.

The uterus was completely didelphic, there being a double external os; the vagina was completely divided by a septum (see Figure II), and on the side of the ectopic ureter and absent kidney there was a congenital vaginal cyst from the duct of Gärtner. On the Fallopian tube of this side too was a cystic hydatid of Morgagni.

The microscopic appearance of the left kidney is shown in Figure III, and atrophic tubules and glomeruli of the knot of tissue representing the right kidney shown in Figure IV. There is no evidence of this being old tuberculous fibrosis. The points in favour of the congenital nature of this agenesia are as given above: (i) Ectopic attachment of ureter. (ii) The non-patency of the ureter. (There had never been a clinical history of uretero-vaginal fistula.) (iii) Absence of even atrophied right renal vessels from aorta or right iliac arteries.

Discussion.

Aristotle is said to have been the first to describe the condition of congenital solitary kidney,[1] but Ballowitz[2] in 1895 seems to have been the first to describe a large number of cases. T. Walker,[3] in his textbook, gives an account which later authors have only been able to embellish.

Campbell[4] is responsible for the statement that the condition occurs in one in 1,600 cases.

As may be imagined, the agenesia may be partial or complete, and three main types therefore exist.[5]. (i) Where there is no trace of the other ureter or kidney, with or without asymmetry of trigone. (ii) Where the other ureteric orifice is present, but the ureter is very short. (iii) Where other ureter reaches its full length and rudimentary renal vessels are present. In the last two groups, of course, the trigone is symmetrically normal.

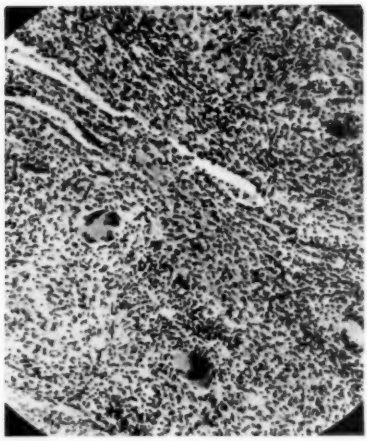

FIGURE III. Showing tubercles in the kidney.

FIGURE IV. Showing immature tubercles in knot of tissue representing the absent kidney.

Collins,[5] of the Mayo Clinic, in 1932 reviews the 581 cases of congenital unilateral renal agenesia recorded in the literature to that date, and produces some interesting figures. The ureter, he says, is present on the agenesic side in 49% of cases, but the dimple representing the ureteric orifice is present in 77% of cases on that side. Though this dimple may not show rhythmic contractions, it nevertheless represents a trap in cystoscopic examination. However, only 25 cases, or 0·5% of cases, have been reported of two patent ureters being associated with congenital solitary kidney. In Sharman's case,[6] for example, the catheter passed 6·25 centimetres (two and a half inches) to the blind end. Occasionally these two orifices represent a double ureter to the single kidney.[7] Hennessey states that the ureteric orifice is present on the side of the absent kidney in only 10% of cases, the difference between this figure and the 49% of Collins being due to the fact that Hennessey has concerned himself with cases in which there has been no sign whatsoever of any renal tissue on the other side.

However, it is evident that the presence of a patent ureteric orifice does not exclude a congenital solitary kidney in 10% of cases, and that the trigone of

the aplasic side and a non-patent dimple are present in an even greater proportion of cases than this.

All writers quote cases showing that the solitary kidney may be ectopic,[8] and that its ureter may enter the opposite side of the bladder[9] or be duplicated, and that the opposite ureter when present may have ectopic openings in bladder, cervix, vagina, *vesiculæ seminale*, *vas deferens*, posterior urethra or rectum.

The adrenal of the affected side is absent in 11% to 25% of cases.[1][9] The reason for this may be connected with the absence of renal arteries on that side.

Associated genital defects are present in 33% of cases.[7] The commonest in the female are unicornuate and bicornuate uteri, didelphic uterus with duplication of vagina, absence of tube or ovary on the affected side and abnormalities of cliteris or labia. In the male, rudimentary *vasa deferentia*, seminal vesicles and hemiatrophy of the prostate occur on the agenesic side, and non-descent of the testis and hypospadias have also been reported.

According to Collins,[1] among all the 581 cases reviewed, the solitary kidney was normal in 48%, diseased in 30%, and its condition not stated in 22%. Of the fatal cases, calculus was the commonest cause of death, closely followed by pyelonephritis and hydronephrosis. Tuberculosis and carcinoma were comparatively rare complications.

The embryological background of these abnormalities is well known. The causation of a congenital solitary kidney seems to be that either the primitive kidney (pro-, meso- and meta-nephros) does not develop at all, in which case there is complete absence of kidney, ureter and genital derivatives on that side, or else that at a later date the metanephric duct refuses to bud off the Wolffian duct when fewer associated genital defects result. It has been pointed out that the Müllerian duct is a later development than the Wolffian duct, and is more liable to be involved in these fœtal processes. This is thought to be the reason why genital abnormalities are more common in the female.

Summary.

1. A case of congenital renal agenesia is reported of sufficient degree to be termed congenital solitary kidney.

2. A review of the literature reveals the frequency with which this condition is associated with genital defects and other pathological conditions of the solitary kidney.

3. Though this case showed only one ureteric orifice in the bladder, such is not always the case.

4. The theory of causation is briefly mentioned.

References.

[1] D. C. Collins: "Congenital Unilateral Renal Agenesia", *Annals of Surgery*, Volume xcv, 1932, page 715.

[2] Ballowitz: Quoted by Thomson Walker, *loco citato*.

[3] Thomson Walker: "Genito-Urinary Surgery", 1914, page 67.

[4] M. F. Campbell: "Congenital Absence of One Kidney: Unilateral Renal Agenesis", *Annals of Surgery*, Volume lxxxviii, 1928, page 1039.

[5] E. Papin and D. N. Eisendrath: "Classification of Renal and Ureteral Anomalies", *Annals of Surgery*, Volume lxxxv, 1927, page 735.

[6] A. Sharman: "Congenital Solitary Kidney", *The Lancet*, Volume ii, 1929, page 63.

[7] R. A. Hennessey: "Congenital Solitary Kidney", *Journal of Urology*, Volume xxi, 1929, page 193.

[8] D. N. Eisendrath: "Congenital Solitary Kidney", *Annals of Surgery*, Volume lxxix, 1924, page 206.

[9] F. R. Hanlon: "Rare Anomaly of the Ureter", *Journal of Urology*, Volume xxi, 1929, page 123.

FLOATING GALL-STONES.

By K. STUART CROSS.

[From the Melbourne Radiological Clinic.]

THE accompanying cholecystograms illustrate an unusual observation. The heavy "dye", with its high iodine content, tends to subside towards the lower pole of the gall-bladder, with the patient erect, giving a density gradient of the dye-containing bile increasing from above downwards.

FIGURE I. Cholecystogram (before luncheon) showing floating gall-stones.

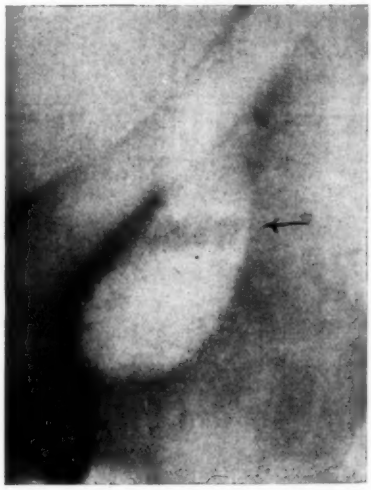

FIGURE II. Same case half an hour after luncheon. (Note change in shape of lower pole.)

In the present case there was a number of small cholesterol calculi. Their density was uniform, and also happened to be intermediate to that of the dye-containing bile in the upper and lower parts of the viscus.

The "stones", therefore, arranged themselves, as shown, in a horizontal stratum about half way up the gall-bladder, seeking a level where the density of the bile exactly equalled their own.

In the early morning film they were first seen near the lower pole, rising to their later positions as the bile became more concentrated.

The Australian and New Zealand Journal of Surgery.

All articles submitted for publication in this journal must be typewritten and double or treble spacing should be used. Each article should conclude with a brief summary and statement of conclusions. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

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VOL. IV. OCTOBER, 1934. No. 2.

THE COLLEGE HEADQUARTERS BUILDING.

THE headquarters building of the Royal Australasian College of Surgeons is completed, and an Australasian College of Surgeons now exists in another sense of the word College; that is, as a building which houses the activities of the College, and which is comparable with the other great surgical colleges in the world.

Now that the building is finished, the harmonious relation which it bears to the spacious garden site on which it stands, can be fully appreciated. The inspiration which the architects have cleverly suggested by its design is also manifest. The soft-toned brickwork, the simple severe lines, the well-balanced proportions, the façade with its tall dignified portico constructed in sandstone, the heraldic decorations, all combine to give the feeling of something fresh in architecture, but still in keeping with tradition. At the first sight, it conveys an academic feeling, something of the purpose for which it is intended. This College, one feels, will, no doubt, be one of the distinctive buildings of Melbourne.

The interior of the building is finished without any ornamentation and in the plainest possible manner. A feature of the main floor is a beautifully proportioned foyer, entered from the portico through tall bronze doors. On this floor are the library, which will be comfortably furnished, administrative offices, and a large lecture hall. On the floor below is another large hall which will be used as a museum. The interior of the upper floor has been left unfinished.

The Council of the College has been fortunate in the singular set of circumstances which have been associated with the establishment of the College headquarters building. The problem of where the headquarters should be situated, did not arise, for, very graciously, the Fellows of the College resident in New South Wales insisted that it should be in Melbourne. Two Victorian Governments with opposite political views were responsible for the donation to the College of the valuable site of the old Model School. The present Premier of Victoria, the Honourable Sir Stanley Argyle, interested himself in the construction and maintenance of the garden site which surrounds the College. The Fellows themselves gave generously towards the expense of the building. Some citizens of Melbourne, having in mind that the College was to be one of the public buildings of the city, subscribed money for its beautification. Chief amongst these was Dr. Edward Alfred Rowden White, a consulting physician, of Melbourne, who gave £1,000 in order that the portico to the College might be built in stone. Mr. Cato, the father of a Fellow of the College, provided £500 to defray the expense of the bronze doors. The late Mr. Sidney Myer gave £100, and Mr. Baillieu £50 towards the furnishing of the College. Thus, though the College has been only seven years in existence, a most valuable College building stands finished and free from debt—a landmark of the progress of surgery in Australia, a heritage for the surgeon of the future, and a possession of which the medical profession of any country in the world would feel proud.

In March, 1935, the College will be opened by the President of the Royal College of Surgeons of England, Sir Holburt Waring. The President of the American College of Surgeons will be represented by Dr. Donald Balfour, the chief surgeon of the Mayo Clinic. The Director-General of the American College of Surgeons, Dr. Franklin Martin, has signified his intention to be present. Representatives of the Councils of the Edinburgh and Irish Colleges have also accepted invitations to be present. A special programme of hospital operative demonstrations and of papers on various subjects, lasting a week, has been arranged.

Papers will be presented by the following distinguished surgeons: Sir Holburt Waring, Sir D'Arcy Power, Sir William I. de Courcy Wheeler, Professor John Fraser, Professor Edward Archibald, Professor C. F. Saint, Dr. Donald C. Balfour, Professor Dean Lewis, Mr. Henry Wade.

It is thus apparent that this meeting of surgeons, at which the College building will be opened, will be one of the most important gatherings of surgeons ever held in Australia or New Zealand. It will be one at which the honour of each Australian and New Zealand surgeon will be at stake; for it will be incumbent on him not only to give a fitting and a hospitable welcome to those distinguished surgeons who will have come so far to do honour to the Fellows of the Royal Australasian College of Surgeons, but also to come forward to help in providing a programme of surgical knowledge and operative technique that will do credit to the Australian and New Zealand schools of surgery. It will, we feel sure, be an historic meeting, and one from which no Fellow of the College can afford to be absent.

H. B. DEVINE.

Surgery in Other Countries.

[In this column will be published short résumés of articles likely to be of practical value from Journals published in other countries and not readily accessible to surgeons in Australia and New Zealand.]

RADIOLOGICAL EXAMINATION OF THE STOMACH BY THE STUDY OF ITS MUCOSAL FOLDS.

S. Kadrnka and E. Naz (Hospital Cantonal, Geneva), "*Résultats actuels du radiodiagnostic de l'estomac par la méthode du moulage du relief interne*", *Journal de Chirurgie*, June, 1934, page 824.

THE authors summarize their methods after five years' experience of radiological study of the folds of the gastric mucosa, using a thin barium emulsion. This work is carried out in conjunction with the classical method of the examination of the stomach filled with barium. The radiological examination consists of three stages, as follows:

1. The patient is given two or three mouthfuls of barium of fluid consistence, and while he is lying on his face the stomach is slowly and widely compressed. A film is taken of the whole stomach, preferably with the Potter-Bucky diaphragm. This method allows one to obtain a picture of the whole stomach with its mucosal folds outlined by a thin coating of barium.

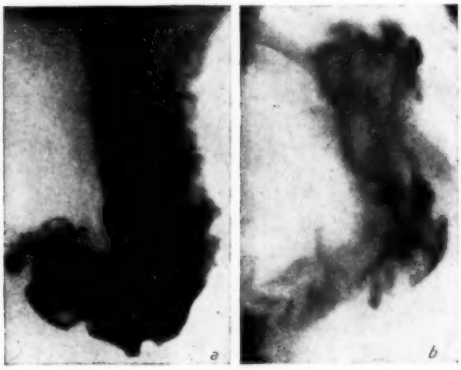

FIGURE I. Clinical history: Gastric pain in a boy of 18. Total acidity, 2·55. Free acid, 1·46. The first X ray picture taken by classical method showed a filling defect on the great curvature, pointing to a benign neoplasm. In Figure I (*a*) large serrations are seen on greater curvature with filling defect at lower part. Figure I (*b*) is a relief image, folds are enlarged and spaces between them are widened; in places the folds are cut at an angle. Radiographic diagnosis: Hypertrophic gastritis. Filling defect due to a tangential view of a fold as it winds round greater curvature. Exploratory laparotomy. No tumour. Naked eye appearance of hypertrophic gastritis confirmed by biopsy.

2. The stomach is then moderately or completely filled with barium, and the usual examination of its contour is followed by an examination of the duodenum and other parts of the alimentary tract.

3. The third stage is used only when the first reveals no abnormality. It consists of the study of the mucosal folds following a localized compression of the stomach walls. Again, while his stomach is empty, the patient is given a few mouthfuls of barium, and, as he lies on his face, the stomach is compressed by means of a wooden box in different places successively. Several pictures are taken with a small cone, but without the Potter-Bucky diaphragm. In this way an area in the stomach, about which there may be doubt, is photographed several times as it is compressed from different directions.

In the same way as can be seen at operation, the vascular congestion and œdema of the stomach mucosa in gastritis may be shown radiologically by an increase in size and spacing of these mucosal shadows. In the usual case of gastritis, there appear localized areas in which the folds are swollen and œdematous; the rest of the mucosa radiologically appears normal. This is considered pathognomonic of gastritis. When the folds are seen to be swollen throughout the whole extent of the stomach, it is possible that this may be due to vascular congestion, such as from heart failure, and not from local inflammation. It is only when these folds are three or more times their normal size that the condition can be attributed to gastritis.

Sometimes, however, it happens that the excess of mucus found in gastritis will form a layer which will prevent the barium from coming in contact with the mucosa. The corrugated appearance then will be masked, and in the first film the stomach will show an amorphous appearance. If, however, the mucus is washed away (as it is by filling the stomach completely with barium in the second part of the examination), the next day, when the stomach is examined for the third time with a few mouthfuls of barium, the folds will show clearly. The authors regard this amorphous appearance as important, and in the third part of their examination they often on close scrutiny find an ulcer, which would ordinarily be masked by the accompanying gastritis. A dappled appearance is frequently seen, especially in the fundus. The authors attribute this to the lifting of the barium by secretion from an over-active mucosa, such as occurs in hyperchlorhydria.

FIGURE II. Clinical history: Hæmatemesis from œsophageal varices or from gastric ulcer. Figure II (*a*) is taken with the stomach full—hypertonic stomach with filling defect. Figure II (*b*) is taken with the stomach compressed. A niche is seen full face in the prepyloric region shown as an opaque spot surrounded by a clear area. Figure II (*c*) is a relief image. Convergence of folds and their interruption by an ulcer crater which has not filled (there is more compression than in the last picture). Radiological diagnosis: A prepyloric ulcer on the posterior surface.

When a stomach is completely filled with barium, an ulcer shows only when its profile can be seen, that is, when it is on or near the lesser curvature. Twenty-five *per centum* of gastric ulcers are situated on the anterior or posterior wall. These, and the rarer type of flat ulcer, are well shown up by the technique outlined here. Not only may the crater filled with barium appear as a dark spot in a paler field, but the mucosal folds will converge towards the crater. Sometimes this star-shaped appearance may be seen in the scar of an old ulcer.

The technique of mucous relief is especially useful in the radiology of gastro-jejunal ulcer, where a pint of barium would completely obscure the field around an anastomosis. The authors have even demonstrated a much swollen fold of mucous membrane, which accounted for the closure of a stoma in bad function after gastroenterostomy.

By the radiological study of the mucosal folds, tumours in the stomach as small as a pea can be seen, which would otherwise be missed. As a general rule,

the mucosal folds can be seen to deviate from a malignant neoplasm or to stop short of it, forming a parapet around the tumour. This is especially so in proliferating cancer. In tumours round the pylorus, the old method of filling the stomach is perhaps more useful, but in tumours of the body of the stomach, X ray examination and study of the surrounding mucosal folds will often show whether an ulcer is malignant or not. Furthermore, in advanced cancer this technique serves to determine the extent of a neoplasm and its operability. If the growth extends along the submucosa, the destruction of the folds will show, forming a palisade around the neoplasm.

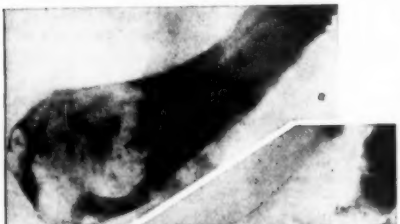

FIGURE III. Clinical history: Pyloric cancer. Total acidity, 0·36. No free acid. Usual type of X ray examination showed huge filling defect in prepyloric region. Figure III (*a*) is taken with the patient prone—large filling defect, with concentric outgrowths. Figure III (*b*) is taken with the patient supine, after insufflation. Folds around the tumour form a raised palisade. Radiographic diagnosis: A cauliflower growth in the prepyloric area—not invading the stomach wall beyond its base (resection possible). Operation: Pyloric resection. Histologically growth was adenocarcinoma.

The majority of benign tumours are hidden by a barium mass as ordinarily given with their technique; an adenoma, a fibroma or a myoma may show with a small crest of barium upon its summit, with the surrounding mucosa extending evenly up to its base; it will be freely mobile, and peristalsis will occur all around it. In the presence of such growths, if they are ulcerated, one can, after the administration of gelatinous barium mixture and air insufflation, see the state of the deeper layers of the walls of the tumour.

By this means, one can discover the condition of the mucosa, the benign or malignant nature of an ulcer crater, or of a tumour. These are considerations of great importance in the medical and surgical treatment of diseases of the stomach. Moreover, the authors find that they can now give radiological reports with more confidence and fewer reservations than previously.

C. FAGGE.

OSTEOCHONDRITIS CAPITULI HUMERI.

A. Nielsen, "Osteochondritis Capituli Humeri", *Der Chirurg*, 1934, Number 12, page 438; Number 13, page 479.

NIELSEN presents an exhaustive clinical study of 168 elbows affected by *osteochondritis capituli humeri*. The lesions occurred in 133 cases, 35 being bilateral. The incidence was predominantly among male patients, and occurred much more frequently in manual workers. The onset of symptoms was placed for the most part between the ages of thirteen and eighteen years.

The disease affects almost entirely two homologous joints, the knee and the elbow, and in these joints homologous parts are involved, the *capitulum humeri* and the internal condyle of the femur. Its manifestations are peculiar to it, and show no connexion with the pathological changes that occur in joints as a result of frank trauma. Nielsen's researches reveal a strong familial tendency, and he considers the heredity factor to be a large one. The condition is essentially a constitutional defect. He does not believe that trauma itself is a sufficient cause, but holds that trauma can cause, in an hereditarily predisposed field, an aseptic necrosis comparable to that seen in Köhler's, Kienbock's and Perthes's

diseases. It differs from these in that the necrosis is limited sharply to a narrow portion of the cartilage; and it shares with them the fact that it is difficult to explain how the onset of a quiet aseptic necrosis occurs. None of the present theories fits the case, and probably an entirely new pathological process must be sought.

Nielsen's material is in two groups: Group A comprises those patients who sought medical aid on account of symptoms; and group B, those whose condition was discovered in the course of a systematic examination. The first group forms only a small minority of the people in whom the condition exists. Nielsen estimates that in his district 4·1% of all young men over the age of fifteen years have evidence of it. In group A are 70 elbows in 55 subjects, mostly young men, who have only had symptoms for a few months. Group B comprises 98 elbows in 78 persons, the age incidence on discovery being approximately equally distributed between the fifteenth and seventy-seventh years. But in both groups the onset of symptoms is fixed at between the thirteenth and eighteenth years.

The clinical course is divided into three stages: (i) A symptom-free stage. At operation on young people who have had only recent symptoms, a condition is found which has obviously been present for longer than the symptoms. (ii) A painful period, coming on when the process is already well developed. The greatest number of patients in this stage are between the ages of thirteen and eighteen. Pain on use, locking of the joint, and limitation of movement are the main reasons for these patients seeking aid. None, however, had to give up their work. (iii) The later course. After a period of weeks, months, or up to two or three years, all symptoms pass off, and all visible effects go. Medical practitioners see only a very few of the cases which reach this stage. In it the joint surfaces on X ray examination present some unevenness of surface, and often one or more loose bodies, but no disability seems to result. Only 43 patients complained of joint locking as a severe symptom, and more than half the patients did not complain of it at all. Only two had even to seek a lightening of their usual work.

Of these three stages, the first is associated with the necrotic process; the painful period with regeneration, and the last stage represents a healed joint. The loose bodies in the first year or so increase in size by cartilage growth and deposit of calcium, and so become less liable to slip into narrow spaces and get nipped. The joint surfaces show a characteristically altered appearance due to the disease, which produces an impression of deformity, but does not increase in later life. It is due to defect in the *capitulum humeri* and overgrowth of the head of the radius. Operation, whether performed early or not, does not prevent its occurrence. In addition to this typical deformity, the joints often show radiologically certain appearances typical of the rheumatoid type in later life. Except possibly owing to altered mechanics of the joint, they do not seem to be connected with the disease causally.

As regards operative treatment, Nielsen does not find it easy to decide whether a good result is due to operation, or to the natural course of the disease. Operation might be recommended with a view to preventing the later arthritic changes, but its value in this respect is doubtful, since this has apparently no relation to the size, number or position of loose bodies. The defect in the capitulum may have a bearing in this respect, but it cannot be altered by operation.

ARTHUR E. BROWN.

QUARELLA'S METHOD OF INDUCING SPINAL ANÆSTHESIA WITH "PERCAINE".

B. Quarella, "*Ma méthode de rachi-anesthésie à la percaine*", *La Presse Médicale*, Number 10, February, 1934.

QUARELLA describes his method of inducing spinal anæsthesia with "Percaine". He bases his remarks on his personal experience in over eighteen hundred cases at his clinic in Turin.

Preparation of the Patient.

1. One hour before spinal puncture a hypodermic injection is given from an ampoule containing scopolamine bromhydrate 0·0006 gramme (one one-hundredth of a grain), morphine chlorhydrate 0·015 gramme (one-quarter of a grain), dissolved in one cubic centimetre of a 10% aqueous solution of mannite.

2. One-quarter of an hour before puncture the patient receives a subcutaneous injection of an ampoule of ephedrine (Merk), five centigrammes. Two ampoules may be used, according to the blood pressure and the magnitude of the surgical intervention. These preliminary injections induce a feeling of well being and a relative medullary hyperæmia, effectually counteracting the consequences of bulbar anæmia following on splanchnic vasodilatation.

Technique of the Spinal Injection.

1. Draw into the syringe 1·4 to 2·0 cubic centimetres (depending on the general condition of the patient and the height of anæsthesia required) of a one in two hundred solution of "Percaine".

2. With the patient sitting in a flexed position, introduce the lumbar puncture needle at a level varying from the twelfth dorsal to the fifth lumbar vertebra, the skin being previously anæsthetized with "Novocain" or "Tutocaine". For high spinal anæsthesia the space between the twelfth dorsal and the first lumbar or between the first and second lumbar vertebræ is chosen.

3. Evacuate five to ten cubic centimetres of cerebro-spinal fluid, depending on its tension and on the level of anæsthesia required.

4. Aspirate into the syringe containing the anæsthetic solution six to eight cubic centimetres of cerebro-spinal fluid, thus diluting the anæsthetic solution to one in 1,000 or one in 1,200; shake the syringe to insure thorough mixing.

5. Inject the solution slowly (ten to twelve seconds) into the subarachnoid space.

6. For high spinal anæsthesia reaspirate and reinject about half the amount of the total injected solution.

7. Without delay the patient is laid flat on the operating table, the head elevated with a pillow and the table inclined 10° to 15° for operations on lower extremities; 20° to 25° for abdominal visceral interventions.

8. Wait fifteen minutes at least, and in major cases twenty to twenty-five minutes before commencing operation.

There is a temporary rapid fall in blood pressure soon after the spinal injection, and there is an objection to opening the abdomen and handling viscera during this phase.

Post-Operative Care.

The patient is maintained in the inclined position during transport and for the following twenty-four hours if possible. When a change in position is necessary, ephedrine injections are given to maintain blood pressure at the desired level.

Results.

With this technique, Quarella has had no failures, and has never had to employ supplementary general anæsthesia. Vomiting and nausea during operation rarely occurred, except following traction on viscera, particularly the stomach.

He holds that spinal anæsthesia is less dangerous than general anæsthesia, and that "Percaine" is far preferable to "Novocain", "Tropocaine" or "Tutocaine".

He contrasts his technique with that employed by Jones. Omitting a preliminary sedative exposes the patient to many psychic traumata. Lumbar puncture in the lateral position is more difficult, and there is more risk of injuring nerve roots.

There is an objection to the introduction of large quantities of fluid into the subarachnoid space (up to eighteen cubic centimetres are used by Jones). It is necessary to wait ten minutes for this large ampoule to become warm in water at 40° C.

With Jones's technique it is possible to give a maximum dose of eighteen milligrammes. Of "Percaine", Quarella's maximum dose is ten milligrammes.

The tension of the cerebro-spinal fluid is raised by Jones's large injections; hence there occurs more rapid absorption by the blood stream of toxic amounts of "Percaine", which is twenty times more toxic than "Novocain".

There is an objection to Jones's practice of turning the patient first on to his face for five minutes and then on to his back for ten minutes. The gentlest handling is essential for complete success in spinal anæsthesia. Quarella holds that his method is precise, simple and efficacious.

F. F. D'ARCY.

Reviews.

THE HAND AND ITS INFECTIONS.

Infections of the Hand: A Guide to the Surgical Treatment of Acute and Chronic Suppurative Processes in the Fingers, Hand, and Forearm. By A. B. KANAVEL, M.D., Sc.D., Sixth Edition, thoroughly revised, 1933. Philadelphia: Lea and Febiger. Australia: Angus and Robertson. Royal 8vo., pp. 567, with 216 engravings. Price: 37s. 6d.

THE sixth edition of "Infections of the Hand", by Kanavel, is even more helpful than its predecessors. Descriptions of the anatomy of the fascial spaces and tendon sheaths, which in former editions were scattered and often repeated, are now presented in the first six chapters. We feel that the presentation of this phase would be more valuable if limited to a clear concise description of the anatomy without the tedious presentation of the steps whereby that knowledge was gained.

On the other hand, the chapters on clinical subjects are enhanced in value by a continual injunction to keep in mind the ultimate function of the hand. This is stressed more than in previous editions, and the author states that, while an intimate knowledge of the anatomy is essential, it is not enough: "From the very beginning of the treatment the preservation of function must be kept constantly in mind and adequate means employed to obviate its loss." "To my mind one of the most important factors in the care of infected hands is the maintenance of the hand in the 'position of function' throughout the treatment. The hand should never be simply surrounded by hot dressings and permitted to lie in an extended position." In the new chapter on the function of the hand in relation to infections, this position of function is described as "that in which the hand is held midway between pronation and supination, dorsiflexed at the wrist, slightly abducted toward the ulnar side, with the phalanges all slightly flexed, and abducted so that the fingers are all separated. The thumb should be rotated and abducted so that the flexor surface of the distal phalanx is opposed but slightly separated from the flexor surface of the distal phalanx of the index finger."

In the same endeavour to preserve function, a careful statement is made regarding movement after operation: "Usually within seventy-two hours after operation gentle passive motion is begun, and carried out for a few moments at the daily change of dressings. Care should be taken that all movements of the fingers and thumb as well as of the wrist and pronation and supination of the forearm are performed. Within five days of operation both passive and active movements are carried out more extensively for fifteen-minute periods three times daily, preferably while the hand is immersed in the bath. The importance of this procedure in preventing permanent stiffness in those cases in which the tendon sheaths are involved cannot be over-estimated."

A new chapter deals with the prophylactic treatment of industrial injuries, and emphasis is made of the value of soap and water as the sole cleansing agent, of immediate application of iodine to even the most trivial injuries and of the removal of every foreign body by the surgeon attached to the industry. "Major injuries which force the employee to report at once, seldom become infected." In Kanavel's experience, a campaign of education of employees proved of great value in lessening the incidence of infections of the hand. "A notice was sent to the manager of the firm, pointing out the danger of the lining of bins which had become loosened, of broken baskets, exposed ends of wire, nails on the floor and pins in packages. All resulted in a decrease in minor accidents and therefore in infection." Kanavel believes there is a close relationship between acute tonsillitis and acute infections of the hand.

The author has not seen sufficient evidence of the value of antistreptococci and antistaphylococci sera in the treatment of infections to urge their use, and cannot speak of the usefulness of bacteriophages.

The chapter on infections about the metacarpo-phalangeal joints following tooth injuries is masterly and depressing. Emphasis is made of the frequency with which the bite involves the metacarpo-phalangeal joint, and it is thought that prevention of the prolonged and severe infection which so often occurs, lies in careful soap and water cleansing, radical excision of damaged tissue (even to removal of tendon), and leaving the wound widely open without any packing or gauze which might interfere with drainage.

Everyone must feel pride in such a book as this, a record of patient progress "during the twenty-five years that have elapsed since this study began".

LISTER.

Lord Lister. By C. J. S. THOMPSON. 1934. London: John Bale, Sons and Danielsson. Crown 8vo., pp. 99, with 3 illustrations. Price 5s. net.

"LORD LISTER", by C. J. S. Thompson, is a short account of the life of Lord Lister, suitable for students and for general readers. The author acknowledges his debt to the better known biographies of this great surgeon, which must always remain the main source of information for the majority of surgeons or for those interested in medical biography. The present small volume, however, dealing as it does with Lister's early life, his remarkable influence on all who came in contact with him, the gradual development of the idea of antiseptic methods, the introduction of special materials and methods, and the profound importance of his work, contains all the salient facts. It is well arranged and well written, and, as it contains all the essential information in a small compass, fills a need, so that it should become popular with all students.

ANATOMY AND PHYSIOLOGY FOR SURGEONS.

Surgical Anatomy and Physiology. By NORMAN C. LAKE, M.D., M.S., D.Sc., F.R.C.S., and C. JENNINGS MARSHALL, M.D., M.S., F.R.C.S. 1934. London: H. K. Lewis & Co., Ltd. Demy 8vo., pp. 898, with 238 illustrations. Price 30s. net.

"SURGICAL ANATOMY AND PHYSIOLOGY", by Lake and Marshall, is the most comprehensive work on this subject that we have yet read. Compiled by two practising surgeons, it is essentially practical, and has been written with a due sense of proportion that is often absent from books of this nature. The amount of information compressed into this work is surprising, and there are few

omissions of any consequence. In addition, the book is written clearly and succinctly, and, dealing as it does not only with anatomy but with development, with normal and disordered functions, with pathology and operative procedures, it fills a real need. In the general section, such systems as the central nervous system, the bones and joints, the fascia and connective tissues, are dealt with in an original and interesting manner. The section on the fascia is particularly good and full of practical suggestions. That on the central nervous system is also up to date; it is not too involved, and yet everything of importance is mentioned; it is illustrated by good clear diagrams, some of which are quite original. In the section dealing with special regions, the authors have dealt with each region in the sequence: development, anatomy, function, operative and other practical considerations. Some of these sections are excellent, and it is difficult to find anything to criticize. Outstanding sections are those dealing with the cranial nerves, the hand, the intestines, the sympathetic system and the genito-urinary system. Both in the arrangement and in the subject matter some of these chapters are unique, and all contain information which can be obtained only from journals and original monographs. Throughout, the importance of a knowledge of embryology as a means of understanding many lesions is emphasized, while there are many references to comparative anatomy and morphology, all of which add greatly to the value and interest of the work. The addition in each section of a short consideration of pathological processes, many of which are dealt with from the point of view of disordered function, is also a new departure. One cannot help being struck by the accurate English, by the balance kept between the claims of different sections, and, above all, by the valuable and very often unique illustrations. This book deserves every success, it fills an urgent need, and can be strongly recommended to all practitioners and students.

GYNÆCOLOGY AND OBSTETRICS.

Gynecology and Obstetrics. Edited by CARL HENRY DAVIS, M.D. In three loose-leaf volumes, with over 700 full pages of illustrations, with from one to eight figures on each page. Medium 8vo. Volume I, pp. 795 + i-xxii + 64 (Index); Volume II, pp. 874 + 64 (Index); Volume III, pp. 739 + 62 (Index). 1934. U.S.A.: W. F. Prior Company, Inc., Hagerstown, Maryland. Sydney: Butterworth & Co. (Aust.), Ltd. Price: £9.

IN the last few years it has become the custom to publish books containing an account of obstetrics and gynæcology, including under the one cover a review of both subjects. This is a modern development which suggests that the correlation of the two subjects is being recognized more extensively.

The work under review is an attempt, and a successful one, to cover the ground which takes into consideration the female reproductive system in all its aspects. We learn from the preface that the work is dedicated to John Clarence Webster and to the memory of John Whitridge Williams by their former students, associates and friends. The editor has recognized the fact that while specialists are necessary in the practice of obstetrics and gynæcology, yet at least 80% of babies will continue to be delivered by the family physician. They have, therefore, planned this work with the object of making it of the greatest possible use to the general practitioner who desires to bring himself up to date in the various departments of gynæcology and obstetrics. The work is from the pen of a number of American gynæcologists and obstetricians. Each writer has dealt with his own subject from his own point of view, but while this leads to a certain amount of overlapping, it confers individuality on the various sections of the work.

Volume I deals with the anatomy and physiology of the female pelvis, with pregnancy, the toxæmias of pregnancy, normal labour and puerperium, the complications of pregnancy and the puerperium itself.

Volume II covers the subject matter of operative obstetrics and the newborn infant. It then deals with gynæcology, commencing with the disorders of function

of the organs of the female pelvis, the affections of the genital organs, then follow sections on tumours, infections and endocrines.

In Volume III, which is devoted entirely to gynæcology, a considerable proportion of the work is directed to diagnosis and examinations, and the special methods of treatment available to the gynæcologists are dealt with in detail. Such general questions as sterility, neurosis, posture and backache, the infections of the urinary tract and the gastro-intestinal tract are discussed. The relation of anæsthesia and modern radiology to gynæcology is comprehensively described. Finally operative gynæcology is dealt with at the end of the third volume.

Each section of the work is written in a brief but strong style. The editor has cut the subject matter down to essentials, which makes it attractive and easy to read. The work is well provided with bold headlines and sub-headings which catch the eye and which enable one to grasp the subject matter easily. The loose-leaf system on which the work is built up enables the authors to bring it up to date by the publication of separate leaves embodying new work. The publishers state that they have at present a number of investigators at work in different parts of the world, keeping the subject matter of the book abreast of modern thought and teaching.

The work is profusely illustrated with excellent coloured photographs, micro-photographs and drawings which reach a very high standard of the illustrator's art. In the scope of a brief review it is impossible to deal adequately with a work which comprises three volumes, but an examination of separate articles shows that all the recent work in the literature has been embodied in the text. The general practitioner and the specialist alike can turn to the different sections of the work and find the information that they require. While the work is far too large for a student, it is valuable to the teacher, as it forms a great reserve of information and knowledge to which the attention of the student can be directed. No gynæcological or teaching library can afford to be without this encyclopædic work.

Proceedings of the Royal Australasian College of Surgeons

ANNUAL MEETING.

THE seventh annual general meeting of the Royal Australasian College of Surgeons was held in Adelaide from February 28 to March 3, 1934. The meeting was attended by approximately one hundred Fellows of the College, including representatives of all the Australian States. Proceedings began at 8.30 p.m. in the Lady Symon Building, when His Excellency Sir Alex. Hore-Ruthven, V.C., Governor of South Australia, declared the meeting open. This was followed by the formal admission of new Fellows, and after this the President of the College, Sir Henry Newland, delivered an address. On Thursday, Friday and Saturday clinical and operative demonstrations were given at the various Adelaide hospitals, which were much appreciated by all visiting surgeons.

ELECTION OF FELLOWS.

The following candidates were elected as Fellows, under the new regulations:

In Surgery—

Victoria: Thomas King, Henry Anthony Phillips, Charles Bernays Melville, Henry Newman Mortensen, Cecil Ashley Marshal Renou.

South Australia: John Christian Mayo, Douglas Gordon McKay.

In Ophthalmology—

Victoria: Esme Vivienne Anderson, William Mitchell Box, William John Lawrence Duncan.

South Australia: Geoffrey Howard Barham Black.

In Laryngo-Otology—

Victoria: Arthur Barton Pilgrim Amies, Cecil Nathaniel Love Cantor.

The following candidates were elected as Fellows, under the old regulations:

Victoria: Charles William Bennett.

Western Australia: Thomas Blake Seed.

COUNCIL REPORT.

The report of the Council is as follows:

Deaths of Fellows.

The Council regrets to report that the following Fellows have died since the last annual general meeting of the College: R. Hamilton Russell (Victoria), W. E. Herbert (New Zealand), H. F. Shorney (South Australia).

Council Election.

The ballot for the election of the Council resulted in the re-election of the retiring members as follows: Sir Henry Newland, E. D. Ahern, A. L. Kenny, Balcombe Quick, F. P. Sandes.

Resignation of the Vice-President.

On August 26, 1933, Sir Alexander MacCormick tendered his resignation as Vice-President of the College. In accepting this resignation with regret, a letter of appreciation was sent to Sir Alexander MacCormick, on behalf of the Council and Fellows, thanking him for the great services which he had rendered in the past, not only to this College, but to Australasian surgery.

At a meeting of the Council held on August 26, 1933, H. B. Devine was elected as a Vice-President of the College, to fill the vacancy in this position created by the resignation of Sir Alexander MacCormick.

Vacancies Created by the Death of the Censor-in-Chief.

The vacancy in the number of elected members of the Council, created by the death of the Censor-in-Chief, was filled by the appointment of Balcombe Quick for the remainder of the late R. Hamilton Russell's term of office.

On August 26, 1933, Alan Newton resigned his position as Honorary Secretary of the College and was appointed Censor-in-Chief for the remainder of the late R. Hamilton Russell's term of office. At this meeting of the Council, the following motion was carried unanimously:

> That an appreciation of the services rendered to this College by Alan Newton be placed on record in the minutes of this meeting of the Council.

Julian Smith, junior, was appointed Honorary Secretary for the remainder of Alan Newton's term of office, and G. R. A. Syme was appointed Honorary Assistant Secretary.

During his term of office, Alan Newton conducted the administrative work of the Censor-in-Chief's department. Under the system of admission then in operation, it was necessary that a senior surgeon, preferably retired from practice, should act as Censor-in-Chief, as admissions were based, not upon an examination of the candidates, but upon a system of references from other practitioners, which were reported upon by State/Dominion Censors, and, later, considered by the Council. The decision of the Council was communicated to the candidates by the Censor-in-Chief.

The introduction of the examination system, conducted by an Australian or a New Zealand Board of Censors, has brought about an alteration in the duties of the Censor-in-Chief, who now becomes, in effect, the Chairman of the Board of Examiners.

The Council, therefore, considered it desirable, in order to reduce the amount of work which must be done by the Honorary Secretary of the College, to divide the administrative work in the following manner:

(*a*) *Duties of the Censor-in-Chief.*

1. He shall act as Chairman of the Board of Censors, and shall perform all duties laid down under the new regulations governing the admission of Fellows. This entails:

(*a*) The critical examination of work done by all applicants for fellowship.

(*b*) Correspondence and/or interviews with surgeons who have been teaching applicants for fellowship.

(*c*) The direction of further work to be done by men whose training has been inadequate at the time of application.

2. He shall conduct negotiations with hospitals and universities in regard to the training of surgeons.

3. He shall attend to the organization and administration of all examinations in which the College is interested.

4. He shall administer research funds under the control of the College.

5. He shall attend to the administration of all teaching activities of the College.

(*b*) *Duties of the Honorary Secretary.*

The Honorary Secretary shall perform all administrative duties not included in the above categories.

Boards of Censors.

The following Fellows were nominated as members of the Board of Censors for the Dominion of New Zealand: Sir Hugh Acland, Sir Louis Barnett, Professor F. Gordon Bell, Sir Donald McGavin, Sir Carrick Robertson, D. S. Wylie; and the following Fellows were nominated as members of the Board of Censors for the Commonwealth of Australia: Professor H. R. Dew (New South Wales), L. C. E. Lindon (South Australia), Sir John McKelvey (New South Wales), Balcombe Quick (Victoria), R. B. Wade (New South Wales), B. T. Zwar (Victoria).

The Censor-in-Chief nominated R. V. Hennessy and G. C. Scantlebury to assist the Board in the examination of candidates for Fellowship in Laryngo-Otology, and J. Ringland Anderson and Mark Gardner to assist in the examination of candidates for Fellowship in Ophthalmology, in Melbourne. The following Fellows were nominated by the Censor-in-Chief to assist in the examination of a candidate for Fellowship in Ophthalmology in Adelaide: Brian F. Moore and A. L. Tostevin.

At a meeting held in Melbourne there were ten candidates for Fellowship in Surgery, three candidates for Fellowship in Ophthalmology and four candidates for Fellowship in Laryngo-Otology. The results were as follows:

	Approved.	Rejected.	Total.
General Surgery	5	5	10
Ophthalmology	3	—	3
Laryngo-Otology	2	1	4*
			17

* Deferred, 1.

At a meeting held in Adelaide there were four candidates for Fellowship in Surgery and one candidate for Fellowship in Ophthalmology. The results were as follows:

	Approved.	Deferred.	Total.
General Surgery	2 ..	2 ..	4
Ophthalmology	1 ..	— ..	1
			5

Total number of candidates 22, of whom 13 were approved.

Primary Fellowship Examination.

The Council is pleased to report that information has been received from the Secretary of the Royal College of Surgeons of England, stating that it proposes to hold the Primary Examination for the Diploma of Fellowship of that College in Melbourne and in Dunedin in November and December, 1934. Professor G. A. Buckmaster and Mr. G. Gordon Taylor will act as examiners in physiology and anatomy respectively. The written paper will be held simultaneously in Melbourne and Dunedin, beginning on Thursday, November 29, 1934. The *viva voce* examination will begin in Melbourne on Monday, December 3, and in Dunedin on Wednesday, December 12.

Positions of Surgical Assistants at Clinical Schools.

The Council is pleased to report that the creation of training positions for young surgeons as assistants to indoor surgeons has been approved by the following hospitals: Royal Prince Alfred Hospital, Sydney; Royal Alexandra Hospital for Children, Sydney; Adelaide Hospital; Melbourne Hospital; Alfred Hospital, Melbourne; Saint Vincent's Hospital, Melbourne; Children's Hospital, Melbourne; Mater Misericordiæ Hospital, Brisbane.

Post-Graduate Hospital in Melbourne.

Since the last annual general meeting, numerous conferences have been held by H. B. Devine and Alan Newton, acting on behalf of the College, with representatives of the staff of the Homœopathic Hospital. It was represented, on behalf of the College, that it was anxious to increase the facilities for post-graduate surgical work in Australia, and that it hoped that a plan could be formulated whereby the resources of the Homœopathic Hospital could be made available for this purpose.

The Board of Management and the members of the honorary staff of the Homœopathic Hospital have cooperated with the College in a cordial manner. The Council desires to record its great appreciation of the help given by members of the surgical staff of the hospital in these negotiations, which have now been brought to a satisfactory conclusion.

It has been decided that the name of the hospital will be changed to "Prince Henry's Hospital", and that the hospital shall give the following courses of post-graduate instruction: (*a*) full-time instruction, (*b*) courses of lectures and demonstrations, (*c*) tutorial classes.

Permanent Headquarters.

In October, 1933, a tender received from J. C. Taylor and Sons Proprietary, Limited, was accepted for the erection of the College building on the Old Model School site in Spring Street, Melbourne. Specifications for the building included the erection of the portico in cement and the large doors of the entrance of the building in wood. Mr. Leighton Irwin, the Architect of the College, pointed out to the Executive Committee that the appearance of the building would be greatly enhanced if these two structures could be erected in stone and bronze respectively, and he suggested to the Council that every effort should be made to obtain an extra £1,000 to carry out his suggestion. The Council was pleased

to report that Mr. F. J. Cato, the father of a Fellow of the College, has generously promised to donate £500 towards the extra money required, on condition that another £500 is subscribed for a similar purpose. The building has been in the course of erection for some months, and will be completed about July of this year.

At a previous meeting, the Council decided that the College building should be opened in March, 1935. The President of the Royal College of Surgeons of England was invited to perform the ceremony of declaring the building open at that time, and has accepted. At the last meeting of the Council, consequent upon inquiries from some distinguished overseas surgeons and from the Secretary of the British Medical Association, London, this matter was reopened, and it was decided to change the date of the opening of the College building to September, 1935, in the week preceding the meeting of the British Medical Association in Melbourne. It was felt, however, that before carrying this proposal into effect, the facts of the matter should be placed before the British Medical Association authorities in Melbourne to gain the sanction of that Association to hold the College ceremony the week preceding its meeting. A letter was therefore written to the Secretary of the British Medical Association in Melbourne, placing the facts before him, and this letter was presented to the General Executive Council of the British Medical Association in Melbourne, and the question that the College building should be opened in the week preceding the British Medical Association meeting was approved. The Executive Committee then communicated this suggestion to the Council of the Royal College of Surgeons of England, and, from the reply received, it appeared that it would be quite impossible for the President of that College to visit Australia in September, 1935. At the same time, the Executive Committee of the College considered the possibility of obtaining the attendance of those surgeons coming out with the British Medical Association delegation at the College meeting. If the opening of the College building were to be held the week preceding that meeting, and the visiting surgeons were to attend the College meeting, then it would be necessary for them to leave London at an earlier date than arranged. A cable was, therefore, sent to the Secretary of the British Medical Association, London, asking if the surgeons visiting Australia at that time might not leave London a week earlier. This was found to be impossible. As the result of these inquiries, the Council of the College decided to adhere to the original proposal to hold the opening ceremony in March, 1935.

Annual General Meeting, 1935.

The next annual general meeting of the College will be held in Melbourne, beginning on Monday, March 4, 1935. The following surgeons have accepted the invitation of the College to attend this meeting: Sir Holburt Waring, Sir D'Arcy Power, Sir William I. de Courcy Wheeler, Professor C. F. Saint, Professor Edward Archibald, D. C. Balfour, Dean Lewis.

The meeting will last for one week, and will be devoted almost entirely to surgical work. On Monday afternoon, March 4, the College building will be declared open by the President of the Royal College of Surgeons of England (Sir Holburt Waring). In the evening, the inaugural meeting will be held in the Wilson Hall, University of Melbourne, when the third George Adlington Syme Oration will be delivered by Professor F. Wood Jones. In the remaining part of the week, operative demonstrations will be held at the Melbourne, Alfred, Saint Vincent's and Children's Hospitals. Surgical papers will be read by surgeons from overseas who are attending the meeting.

Librarian's Report.

The College library is now receiving forty-six journals in exchange for THE AUSTRALIAN AND NEW ZEALAND JOURNAL OF SURGERY. The completed volumes are now in the hands of the binders, and will be ready for the library when the College building is opened. At present, very few donations of books have been received, but the Librarian would be very grateful if intending donors would notify him of any back number journals or surgical literature which they can make available when the College building is completed.

Birthday Honours.

The Council is pleased to report that, since the last annual general meeting, the following Fellows have been honoured by His Majesty: Thomas Peel Dunhill, K.C.V.O.; Hugh T. D. Acland, K.B.; F. A. Maguire, C.M.G.

JOURNAL REPORT.

Volume II, Numbers 3 *and* 4*; Volume III, Numbers* 1 *and* 2.—Of these issues, two were devoted to the work of clinical schools. January, 1933 (Volume II, Number 3), consisted of articles contributed by the staff of the Melbourne Hospital, and October, 1933 (Volume III, Number 2), of articles from the Royal Prince Alfred Hospital, Sydney.

Financial.

The auditors report that, for the year ended January 31, 1933, a loss of £158 6s. was sustained, while for the year ended January 31, 1934, a profit of £96 3s. 11d. was revealed. Both these results were shown after payment by the College to the Journal Section of the *per capita* grant of £1 per Fellow *per annum*. The improvement in the result was effected principally by (*a*) a reduction in the printing and publishing expenses, (*b*) an increase in the revenue received from advertisements.

The position at January 31, 1934, was that of the amount of £589 14s. 11d. owing to the College, £281 19s. 10d. was written off by the College as irrecoverable, the balance, namely, £308 15s., will be paid to the College by the journal.

Negotiations with Butterworth and Company (Australia), Limited, for Publication of the Journal.

During the year the Executive Committee entered into negotiations with Butterworth and Company, Medical and Law Publishers, of London and Australia, with regard to the publication of the journal by them. A definite offer was made to the Executive Committee by Butterworth and Company (Australia), Limited, to publish the journal under a financial arrangement which they set out in this offer. The Executive Committee considered the proposal a very favourable one, and, after consultation with the members of Council, signed an agreement with Butterworth and Company, whereby in future the journal will be published by them. The January, 1934, issue of the journal was the first one published by Butterworth and Company.

Butterworth and Company have retained the services of Dr. Archdall as Editor of the journal, and they have also made arrangements with the Australasian Medical Publishing Company, Limited, to print the journal. The Council has been very satisfied with the manner in which the Australasian Medical Publishing Company, Limited, has printed the journal.

REPORT OF EDITORIAL COMMITTEE TO COUNCIL: YEARS 1933-1934.

Volume II, Numbers 3 *and* 4*; Volume III, Numbers* 1 *and* 2.—Of these issues, two were devoted to the work of clinical schools. January (Volume II, Number 3) consisted of articles contributed by the staff of the Melbourne Hospital, and October (Volume III, Number 2) of articles from the Royal Prince Alfred Hospital, Sydney. The following committees, appointed for the staffs of the respective hospitals, were responsible for the hospital numbers:

For the Royal Prince Alfred Hospital: Professor Dew, Mr. Douglas Miller, Dr. Corlette, Dr. Susman, Dr. Angel Money.

For the Melbourne Hospital: Mr. B. T. Zwar, Mr. Julian Smith, junior.

As a result of the taking over of the publishing of the journal by Butterworth and Company (Australia), Limited, the Editorial Committee has, under an agreement, the responsibility of keeping this firm supplied with suitable scientific matter for the journal. In order to carry on the work of the Editorial Committee

during the year, and thus help the publishers, Editorial Executive Committees have been formed as follows:

Sydney: Professor Dew, Mr. Douglas Miller, Dr. Corlette, Dr. Susman, Dr. Angel Money.

Melbourne: Mr. H. B. Devine, Mr. B. T. Zwar, Mr. Balcome Quick, Mr. Julian Smith, junior.

New Zealand: Sir Louis Barnett, Mr. D. S. Wylie, Professor Gordon Bell.

The Editorial Committee would like to record its appreciation of the manner in which Dr. Mervyn Archdall has carried out his duties as Editor. It would also like to compliment the Australasian Medical Publishing Company, Limited, on the manner in which it has published the journal.

H. B. DEVINE,
Chairman, Editorial Committee.

DOUGLAS I. MILLER,
Secretary, Editorial Committee.

Editorial Notices.

EDITORIAL communications should be addressed to the Chairman of the Editorial Committee, 57 Collins Street, Melbourne, or to any member of the Editorial Committee. It is understood that original articles forwarded for publication are offered to THE AUSTRALIAN AND NEW ZEALAND JOURNAL OF SURGERY solely, unless the contrary be stated.

Reprints can be supplied at cost price; the minimum number is fifty copies. Orders for reprints must be given when the proof is returned.

Exchange journals should be addressed to Mr. G. R. A. Syme, 6 Mayfield Avenue, Malvern, S.E.4, Victoria.

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